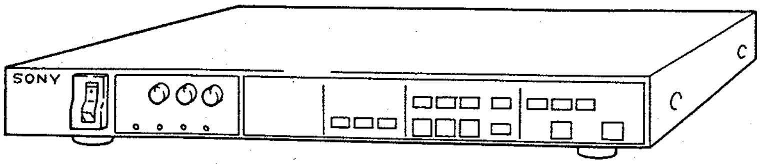
SONY®

SIMPLIFIED TIME BASE CORRECTOR

MPU-F100P

SERVICE MANUAL



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WARNING !!

AN ISOLATION TRANSFORMER SHOULD BE USED DURING ANY SERVICE TO AVOID POSSIBLE SHOCK HAZARD, BECAUSE OF LIVE CHASSIS.
THE CHASSIS OF THIS RECEIVER IS DIRECTLY CONNECTED TO THE AC POWER LINE.

SAFETY-RELATED COMPONENT WARNING !!

COMPONENTS IDENTIFIED BY SHADING AND MARK ⚠ ON THE SCHEMATIC DIAGRAMS, EXPLODED VIEWS AND IN THE PARTS LIST ARE CRITICAL TO SAFE OPERATION. REPLACE THESE COMPONENTS WITH SONY PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL OR IN SUPPLEMENTS PUBLISHED BY SONY.

SECTION 1
GENERAL

This section is extracted from instruction manual.

1-1. SPECIFICATIONS

Input connectors

Composite video input	BNC connector, 1.0 Vp-p, 75 ohms unbalanced, sync negative
S video input	S connector Y: 1.0 Vp-p, 75 ohms unbalanced, sync negative C: 0.3 Vp-p, 75 ohms unbalanced
R.G.B.	BNC connector, 0.7 Vp-p, 75 ohms unbalanced SYNC: BNC connector, 1.0 – 4.0 Vp-p, 75 ohms unbalanced, sync negative
R-Y/Y/B-Y *	Y: 1.0 Vp-p, 75 ohms unbalanced, sync negative R-Y: 0.7 Vp-p, 75 ohms unbalanced B-Y: 0.7 Vp-p, 75 ohms unbalanced
Reference video	1.0 Vp-p, 75 ohms unbalanced, sync negative Composite video or black burst signal

Output connectors

Composite video output	BNC connector, 1.0 Vp-p, 75 ohms unbalanced, sync negative
S video output	S connector Y: 1.0 Vp-p, 75 ohms unbalanced, sync negative C: 0.3 Vp-p, 75 ohms unbalanced
R.G.B.	BNC connector, 0.7 Vp-p, 75 ohms unbalanced SYNC: BNC connector, 4.0 Vp-p, 75 ohms unbalanced, sync negative
R-Y/Y/B-Y *	Y: 1.0 Vp-p, 75 ohms unbalanced, sync negative R-Y: 0.7 Vp-p, 75 ohms unbalanced B-Y: 0.7 Vp-p, 75 ohms unbalanced

* RGB input/output signal and R-Y/Y/B-Y input/output signal can be selected by the DIP switches.

Control signal connectors

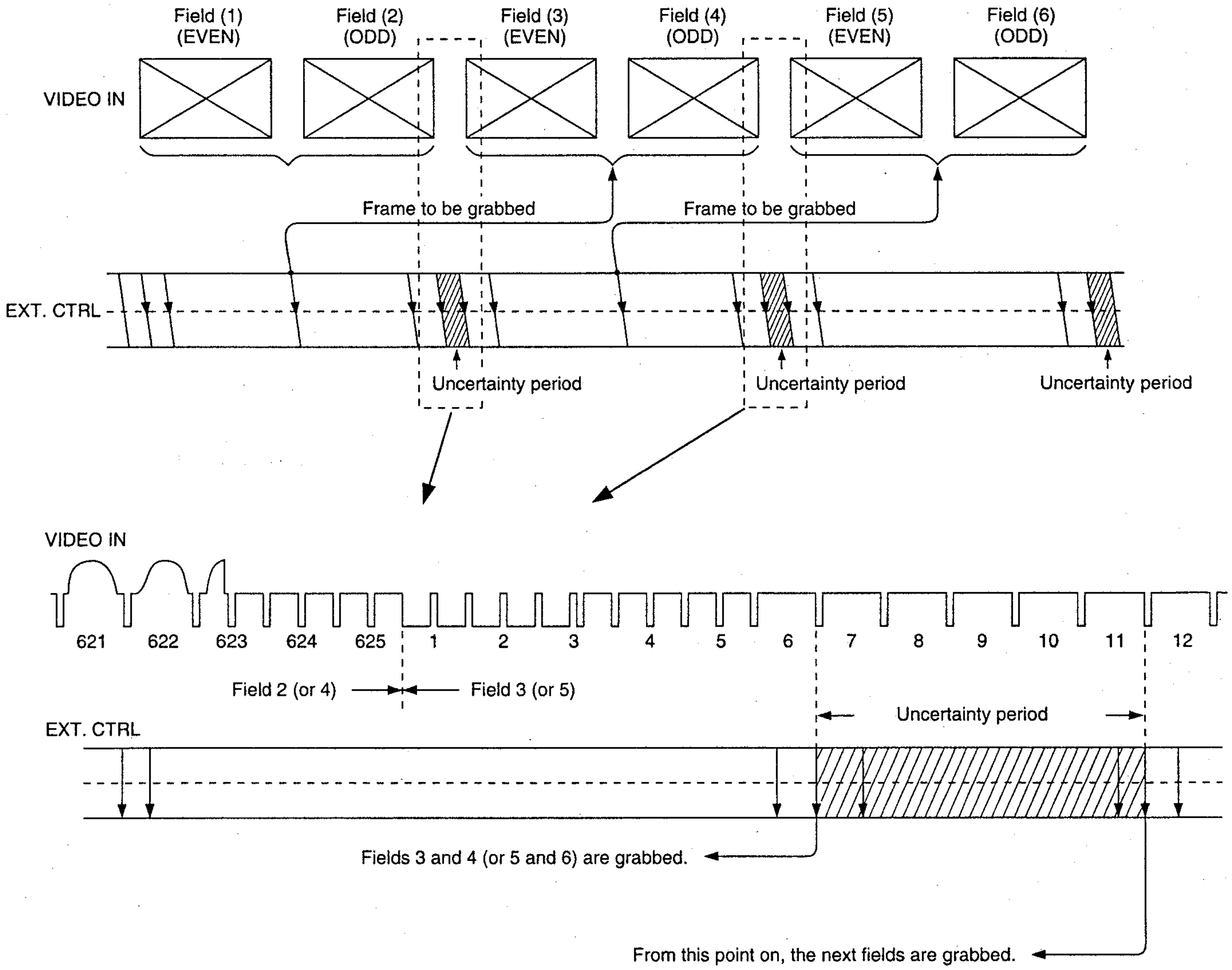
RS-232C	25-pin, D-sub
External control	Mini jack

Others

Memory input	Odd field, even field, and frame
Picture effects	Lap dissolve (transition duration 1.5 sec) Mosaic Posterization (solarization) Multi-picture (3 x 3)
Sync lock	Horizontal sync phase: –0.5 to +1µsec Subcarrier phase: 0° to 360°
Operating temperature	5° to 35°C (41° to 95°F)
Storage temperature	–10° to 60°C (14° to 140°F)
Power requirements	220, 230, 240 V AC selectable, 50 Hz
Power consumption	0.2 A max
Dimensions	Approx. 424 x 54 x 446 mm (wxhxd) ($16^{3}/_{4}$ x $2^{1}/_{8}$ x $17^{5}/_{8}$ inches) including projections
Weight	6.4 kg (14 lb 2 oz)
Supplied accessories	Power cable (1) Rack angles (2) Washers (4) Screws (+RK5 x 14) (4) Screws (+B4 x 8) (4) Interface manual (1)

Design and specifications subject to change without notice.

Edge Trigger Mode Timing


Field (1) (EVEN)
Field (2) (ODD)
Field (3) (EVEN)
Field (4) (ODD)
Field (5) (EVEN)
Field (6) (ODD)
VIDEO IN
Frame to be grabbed
Frame to be grabbed
EXT. CTRL
Uncertainty period
Uncertainty period
Uncertainty period
VIDEO IN
621
622
623
624
625
1
2
3
4
5
6
7
8
9
10
11
12
Field 2 (or 4)
Field 3 (or 5)
Uncertainty period
EXT. CTRL
Fields 3 and 4 (or 5 and 6) are grabbed.
From this point on, the next fields are grabbed.

When the edge trigger pulse ($\urcorner\!\lrcorner_{0V}^{5V}$) is input during an uncertainty period, the next frame will not always be grabbed. (The frame after the next may be grabbed.)

1-2. OVERVIEW OF THE MPU-F100P SIMPLIFIED TIME BASE CORRECTOR

The MPU-F100P is a time base corrector to offer pictures without jitter or skew errors. The MPU-F100P grabs the picture in memory and adds picture effects.

Accepts a variety of video playback sources

You can use the MPU-F100P with VCR or videodisc players.

Works as a frame synchronizer

The MPU-F100P synchronizes the input video signal with the reference video signal. Therefore, you can obtain video pictures without jitter or skew errors. This synchronization permits you to use video equipment in a production system for computer graphics.

To make more elaborate pictures

The mosaic, posterization (solarization) and multi-picture effects permit you to make more elaborate pictures.

Adjustments of the input signal

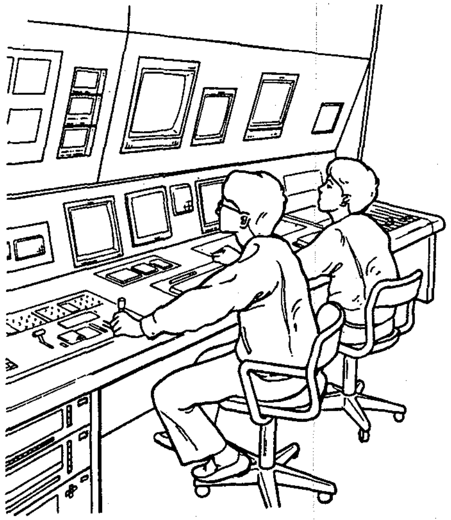
Chroma adjustments of the composite video signal and the S-video signal are possible. Adjusting of the video level and set-up level of all input signals is also available.

Auto-grabbing function when the input signal is stopped

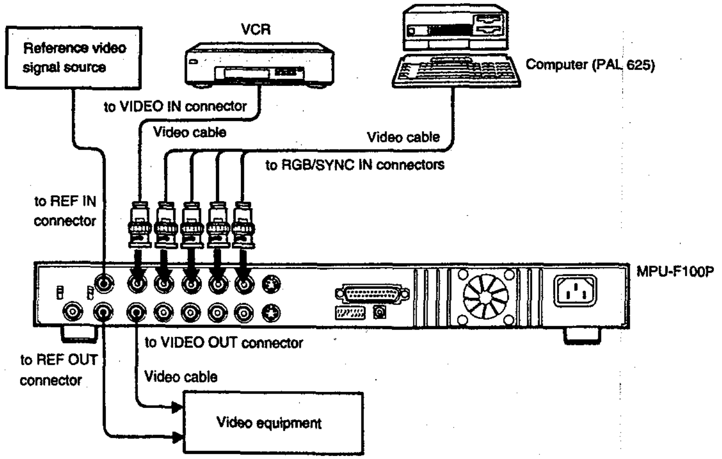
By setting SW8 of the DIP switches on the rear panel to ON/OFF, even if the input signal is disconnected, the MPU-F100P automatically grabs the picture in the memory and outputs it until the next picture is transmitted.
In auto-grabbing, noise may appear on the screen.

1-3. SUGGESTED APPLICATIONS AND CONNECTIONS

The MPU-F100P allows you to create a high quality software.
The MPU-F100P works as a frame synchronizer in various video systems using the VCR or videodisc player.



System examples

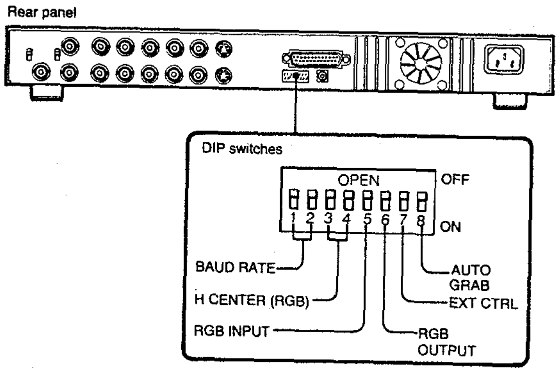

Reference video signal source
VCR
Computer (PAL 625)
to VIDEO IN connector
Video cable
Video cable
to RGB/SYNC IN connectors
to REF IN connector
MPU-F100P
to VIDEO OUT connector
to REF OUT connector
Video cable
Video equipment

1-4. SETTING THE DIP SWITCHES

Make the following settings with the DIP switches on the rear panel.

- Baud rate setting for computer communication interface configuration.
- H CENTER setting of the RGB input.
- Selecting the INPUT/OUTPUT signals.
- *Selecting the* EXT CTRL operation mode.
- AUTO GRAB setting to ON or OFF.

The DIP switches are located as illustrated below.



Setting the baud rate

When controlling the MPU-F100P with the computer connected to the RS-232C connector, select the appropriate baud rate with SW1 and SW2. Refer to the interface manual for further information about baud rate setting.

BAUD RATE

Baud rate (bps)	SW1	SW2
1200	OFF	OFF
2400	ON	OFF
4800	OFF	ON
9600	ON	ON

Setting the H CENTER (RGB)

The position of the picture on the monitor screen can be moved to the left or to the right. when the RGB signal is used. Use SW3 and SW4.
This adjustment does not affect the picture stored in memory.

H CENTER (RGB)

Adjustable position	SW3	SW4
To the left	OFF	OFF
Slightly to the left	ON	OFF
Slightly to the right	OFF	ON
To the right	ON	ON

Selecting the INPUT/OUTPUT signals

Either the RGB signal or COMPONENT(R-Y/Y/B-Y) signal can be selected. Use SW5 to select the type of the input signal. Use SW6 to select the type of the output *signal.*

INPUT SELECT

	SW5
COMPONENT	OFF
RGB	ON

OUTPUT SELECT

	SW6
COMPONENT	OFF
RGB	ON

When selecting the COMPONENT (R-Y/Y/B-Y) signal, each RGB connector on the rear panel corresponds to the component signal as follows:
R: R-Y
G: Y
B: B-Y

Selecting the EXT CTRL operation mode

When controlling the unit's grabbing function with the external control signals via the EXT CTRL connector, use the SW7 to select the EXT CTRL operation mode either from the edge trigger mode or the level mode.

EXT CTRL

	SW7
Edge trigger mode: grabs a picture with the fall edge signal (⌐_${}^{5V}_{0V}$).	OFF
Level mode: grabs a picture with the low level (when a signal is shorted).	ON

In the edge trigger mode, the unit operates when the fall edge signal for TTL level (⌐_${}^{5V}_{0V}$) is first input. In the level mode, the unit operates with an open/short control signal. When the edge trigger mode is selected, note the following.

- When an asynchronous signal is input, the unit may skip the first two fields and grab the next two fields.
- The unit cannot grab the varied-speed playback pictures.
- You may not select multi-picture mode even if you press the MULTI key.

Setting the AUTO GRAB

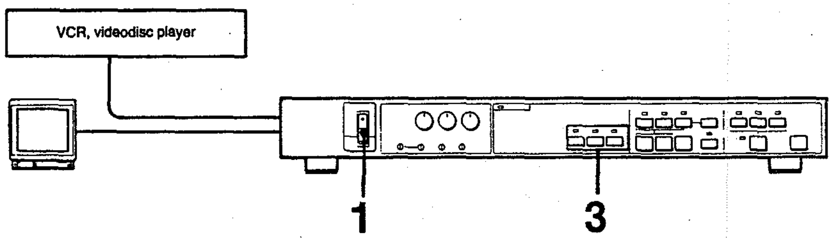
When the input signal is intermitted, the last signal can be grabbed automatically.
Use SW8 to set to ON or OFF.

AUTO GRAB

	SW8
to grab automatically	OFF
not to grab automatically	ON

1-5. PREPARING THE MPU-F100P

Start playing the connected equipment, then select the input signal on the MPU-F100P.



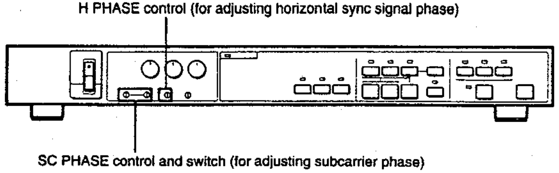
1 **Press the POWER switch.**
The unit is turned on.

2 **Start the playback of the source equipment connected.**

3 **Press either key of the VIDEO, S VIDEO, or RGB/ COMPONENT which corresponds to the source signal connector.**
The indicator of the key selected lights up.
VIDEO: Selects the source connected to the VIDEO IN connector on the rear panel.
S VIDEO: Selects the source connected to the S VIDEO IN connector on the rear panel.
RGB/COMPONENT: Selects the source connected to the RGB (R-Y/Y/B-Y)/ SYNC IN connector on the rear panel.
When the source is RGB, the indicator lights in green. When the source is a COMPONENT one, the indicator lights in orange.
If the selected connector has no input signal, the indicator of the key selected blinks in one second cycle.

1-6. SYNCHRONIZING WITH OTHER VIDEO EQUIPMENT

Make the subcarrier phase adjustment and the horizontal sync signal phase adjustment to precisely synchronize the MPU-F100P's output to the external reference signal. Refer to page 26 for connection.


H PHASE control (for adjusting horizontal sync signal phase)
SC PHASE control and switch (for adjusting subcarrier phase)

Adjusting the subcarrier phase

Turn the SC PHASE control.
The subcarrier phase is adjustable from 0° to 180° by turning the SC PHASE control with the SC PHASE switch set to 0°. If a phase of over 180° is to be adjusted, set the SC PHASE switch to 180°, then turn the SC PHASE control.

Adjusting the horizontal sync signal phase

Turn the H PHASE control. The adjustable range is –0.5 to +1µsec.

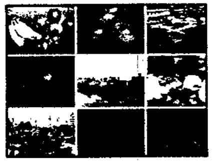
1-7. ADDING THE PICTURE EFFECTS

You can add the picture effects of mosaic, posterization (solarization) and multi-picture (3 x 3).

Mosaic picture

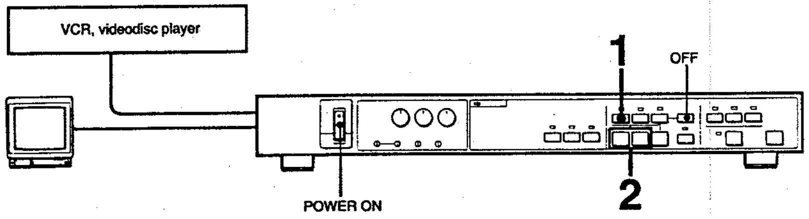
Posterization (solarization) picture

Multi-picture



Adding the Mosaic Effect

The mosaic effect can be selected in four sizes.


VCR, videodisc player
1
OFF
POWER ON
2

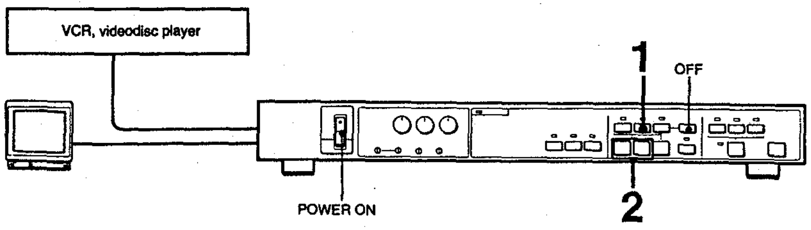
1 **Display a picture on the monitor and press the MOSAIC key.**
The indicator of the key lights up.

2 **Press either the + or – key to select the size of the mosaic piece.**

Canceling the mosaic effect
Press the OFF key. The indicator of the MOSAIC key goes off.

Adding the Posterization (Solarization) Effect

The posterization effect can be selected in three levels.


VCR, videodisc player
1
OFF
POWER ON
2

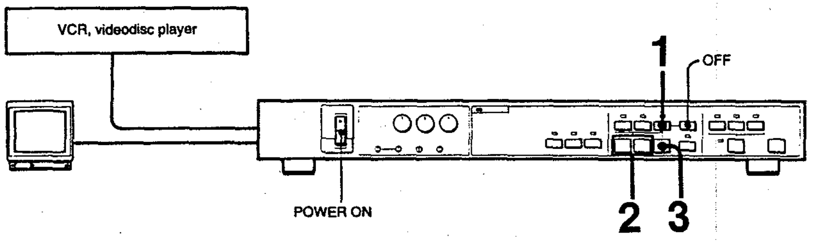
1 **Display a picture on the monitor and press the POSTER key.**
The indicator of the key lights up.

2 **Press either the + or – key to adjust the posterization level.**

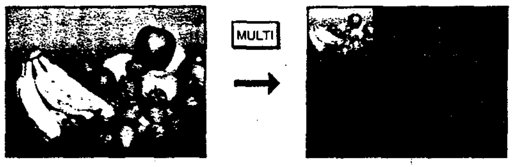
Canceling the posterization effect
Press the OFF key. The indicator of the POSTER key goes off.

Adding the Multi-picture Effect

The monitor screen is divided into 9 areas and the live picture can be placed at any of them.

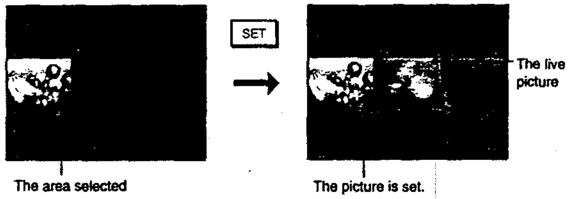

VCR, videodisc player
1
OFF
POWER ON
2 3

1 **Display a picture on the monitor and press the MULTI key.**
The indicator of the key lights up. A live picture appears on the upper left area.



2 **Press either the + or – key to select the area where the live picture appears.**

3 **When you display the picture at the desired position, press the SET key.**
The picture is set to the selected area and the live picture moves to the next area.


SET
The live picture
The area selected
The picture is set.

4 Repeat steps 2 and 3 to set the picture to other areas.

Displaying the live picture in the upper left area
Press the MULTI key and the live picture appears on the initial position (the upper left area).

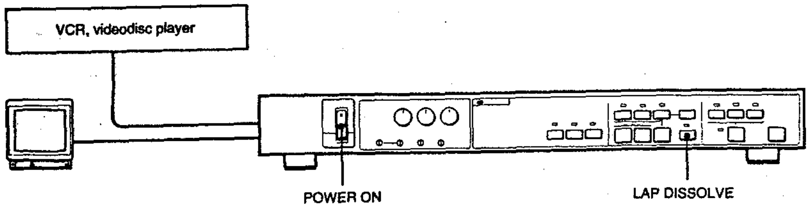
Canceling the multi-picture effect
Press the OFF key. The indicator of the MULTI key goes off.

Note

Do not disconnect the input signal during multi-picture display. If you press the OFF key to cancel the multi-picture effect while the input signal is disconnected, the picture may be disturbed.

Cross-fading (Lap-dissolve) Pictures

The lap-dissolve effect allows you to switch both the motion pictures and still pictures naturally and smoothly. With this effect, you can obtain the after-image effect when motion pictures are being input. When switching the still pictures, one picture fades out gradually, while the other fades in.
You can use this effect with the mosaic and posterization effects.


VCR, videodisc player
POWER ON
LAP DISSOLVE

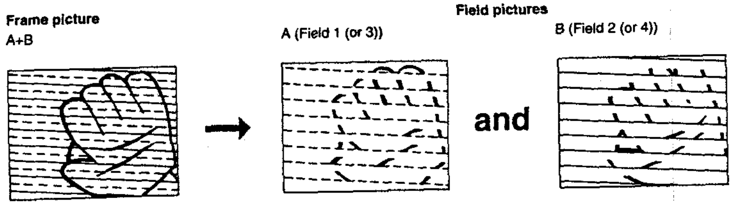
Press the LAP DISSOLVE key to switch the pictures with lap-dissolve effect.
The indicator of the key lights up.

Canceling the lap-dissolve effect
Press the LAP DISSOLVE key again. The indicator of the key goes off.

1-8. GRABBING PICTURES (STORING PICTURES IN MEMORY)

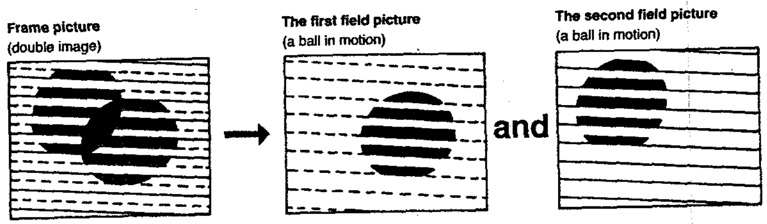
Frame and Field of the Grabbed Picture

The picture on the screen is composed of two rough pictures; each picture is called "even field and odd field". By combining the two field pictures, a frame picture is obtained.
The MPU-F100P grabs a picture as a frame one.

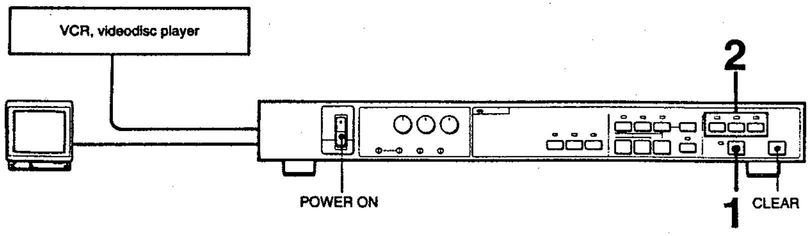

Frame picture
A+B
Field pictures
A (Field 1 (or 3))
and
B (Field 2 (or 4))

When grabbing a picture which is moving in high speed

The outline of the picture may be doubled when grabbing a high-speed motion picture. This is because the first and second field pictures are slightly different in motion. In such a case, display either field picture on the screen to eliminate the double image.


Frame picture
(double image)
The first field picture
(a ball in motion)
and
The second field picture
(a ball in motion)

Grabbing a Picture



1 **Display a picture on the monitor screen and then press the MEMORY IN key to grab it.**
The indicator of the key lights up.

2 **Press either FIELD EVEN, FIELD ODD, or FRAME key to select the picture to be displayed.**
The indicator of the key selected lights up.
FIELD EVEN: To display an even field picture.
FIELD ODD: To display an odd field picture.
FRAME: To display a frame picture.

Canceling the grabbing mode
Press the CLEAR key. The indicators of the selected keys go off.

Note

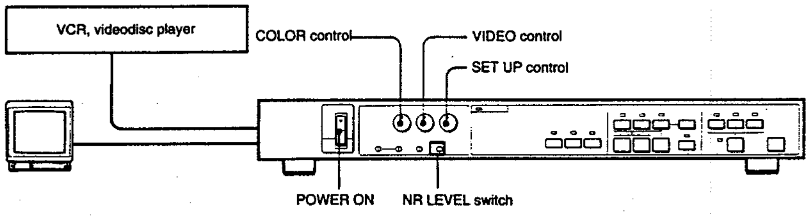
When a picture is played back in varied speed, you may not be able to grab the picture properly.

To grab other pictures

Press the CLEAR key to clear the memory and display the live picture. Then select the desired picture to grab it in memory.

1-9. ADJUSTING THE INPUT SIGNAL LEVEL

Adjust the colour, video level, set up level, and noise reduction level of the input signal.
You can obtain the factory-preset level of each control when it is pushed in.



Adjusting the Colour

Adjusting the colour of the VIDEO input or S VIDEO input signal.
Push the COLOR control so that the control comes out, and turn the control to obtain the appropriate colour.
This adjustment does not affect the picture grabbed in memory.

Adjusting the Video Level

Adjust the video level for all video source signals.
Push the VIDEO control so that the control comes out and turn the control to obtain the appropriate contrast.
This adjustment affects the picture grabbed in memory.

Adjusting the Set-up Level

Increase the set-up level for all video signals, if necessary.
Push the SET UP control so that the control comes out and turn the control while monitoring the screen.
This adjustment also affects the picture grabbed in memory.

Adjusting the Noise Reduction Level

When the picture is noisy, use the NR LEVEL switch to decrease the noise in the chroma and luminance signals.
The noise reduction function of the NR LEVEL switch is as listed below.

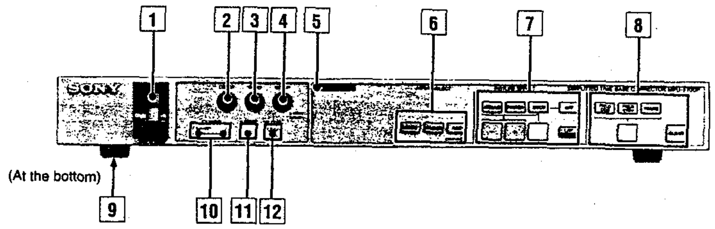
NOISE REDUCTION FOR STILL PICTURE

Setting position	Noise reduction for chroma signal (CNR)	Noise reduction for luminance (YNR)
1	OFF	OFF
2	ON	OFF
3	ON	Slightly
4	ON	Deep

When adjusting the NR LEVEL for the moving pictures, set the switch to 2 or 3.

1-10. LOCATION AND FUNCTION OF PARTS AND CONTROLS

Front panel



1 POWER switch
Turns the MPU-F100P on or off.

2 COLOR control
Adjusts the colour of the VIDEO or S VIDEO input signal. This control does not affect the colour of the picture grabbed in memory.

3 VIDEO level control
Adjusts the contrast of all the video input signals. This control affects only the video signal level, and does not affect the sync level.

4 SET UP level control
Increases the set-up level of the input signal.

5 REMOTE indicator
Lights up when controlling the MPU-F100P externally with the equipment connected to the RS-232C connector on the rear panel.

6 INPUT SELECT keys and indicators
Press to select the input signal. The indicator of the selected signal lights up.
VIDEO: Composite video signal connected to the VIDEO IN connector on the rear panel.
S VIDEO: S video signal connected to the S VIDEO IN connector on the rear panel.
RGB/COMPONENT: RGB signal or component video signal connected to the RGB (R-Y/Y/B-Y) connectors on the rear panel.
When the source is RGB, the indicator lights in green. When the source is a COMPONENT one, the indicator lights in orange.

7 PICTURE EFFECT keys and indicators
Press to select a picture effect. The indicator of the selected effect lights up.
MOSAIC: Adds a mosaic effect. The size of the mosaic piece can be changed by pressing the + and – keys.
POSTER: Adds a posterization effect. The level of the effect can be changed by pressing the + and – keys.
MULTI: The screen is divided into 9 areas (3x3). The live picture can be moved by pressing the + and – keys and the picture can be set to the desired area by pressing the SET key.
OFF: Cancels the picture effect.
+/–: Used for mosaic, posterization and multi-picture effects.
SET: Sets the picture to the desired area in the multi-picture effect.
LAP DISSOLVE: Switches the pictures from one to the other with the fade-out and fade-in effect. To cancel the lap-dissolve effect, press this key again.

8 Keys for grabbing pictures and indicators
Used to grab a picture in the memory of the MPU-F100P and to select the display mode of the picture grabbed in memory.
The indicator of the selected mode lights up.
FIELD EVEN: Displays an even field picture.
FIELD ODD: Displays an odd field picture.
FRAME: Displays a frame picture.
MEMORY IN: Grabs a picture in the memory of the MPU-F100P.
CLEAR: Clears the picture grabbed.

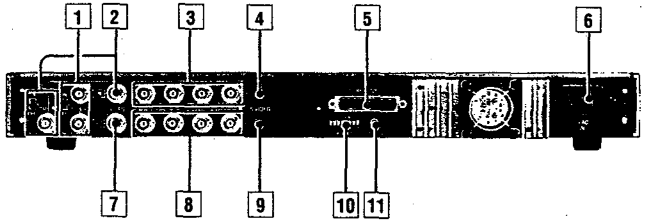
9 Voltage selector (220 V AC/230 V AC/240 V AC) (located at the bottom)
Selectable by a qualified person. When you have to reset the voltage selector, please contact your nearest Sony dealer.

10 SC PHASE control and switch
Adjusts the subcarrier phase of the input signal to the reference sync signal. The adjustable range is 360°: Turn the SC PHASE control to adjust the range between 0° to 180°. To adjust the range above 180°, set the SC PHASE switch to 180° then turn the SC PHASE control.

11 H PHASE control
Adjusts the horizontal sync phase to the reference sync signal. The adjustable range is –0.5 to +1µsec.

12 NR LEVEL switch
Reduces the noise in the chroma and luminance signal. Three reduction levels are available. The noise reduction function is more effective for still pictures.

Rear Panel



1 REF IN and OUT connectors (BNC type), and 75Ω switch
Connect to the external reference sync signal generator which supplies the reference sync signal of composite video or black burst. When the MPU-F100P accepts the reference signal, the video signal synchronized automatically.
For distributing the reference sync signal to other equipment, use either connector as an output one for loop-through connection and set the 75Ω switch to OFF.

2 VIDEO IN connectors (BNC type) and 75Ω switch
Connect to the VIDEO OUT connector of the VCR or videodisc player.
For distributing the video signal to the other equipment, use either connector as an output one for loop-through connection and set the 75Ω switches to OFF.

3 RGB (R-Y/Y/B-Y)/SYNC IN connectors (RGB input) (BNC type)
Connect to the R, G, B, and R-Y/Y/B-Y output connectors of the VCR or videodisc player. Either RGB input or R-Y/Y/B-Y input can be selected with the DIP switches. For the DIP switch setting, refer to page 7.

4 S VIDEO IN connector (S type)
Accepts S video input signal. Connect the VCR or videodisc player having S video output.

5 RS-232C connector
Connect the computer for controlling the MPU-F100P. For details on the computer control, refer to the interface manual of the MPU-F100P.

6 AC IN connector
Connect the supplied power cable.

7 VIDEO OUT connector (BNC type)
Connect the video input connector of a colour video monitor or a computer.

8 RGB (R-Y/Y/B-Y)/SYNC OUT connectors (RGB output) (BNC type)
Connect the R, G, B, and SYNC input connectors of a colour monitor or a computer. The RGB or the R-Y/Y/B-Y output signal can be selected by the DIP switches. For details, refer to page 7.

9 S VIDEO OUT connector (S type)
Connect a monitor having S video input.

10 DIP switches
Set the switches for baud rate setting of the RS-232C connector, the picture position adjustment of RGB input, input signal selection, output signal selection of RGB or R-Y/Y/B-Y, EXT CTRL operation mode selection, and auto-grab setting. For the switch setting, refer to pages 6 to 8.

11 EXT CTRL (external control input signal) connector (mini jack)
Used for controlling the MPU-F100P with an open/short signal (level mode) or fall edge signal for TTL level (edge trigger mode). The MPU-F100P grabs a picture in memory when the signal is shorted or the fall edge signal (⌝⌞ $^{5V}_{0V}$) is input. For setting the EXT CTRL operation mode with the DIP switches, refer to page 7. For the timing of the edge trigger mode, refer to page 30 .

1-11. CONNECTIONS

The acceptable equipment is illustrated on the following pages.
For connection diagram of each equipment, refer to each section listed below.

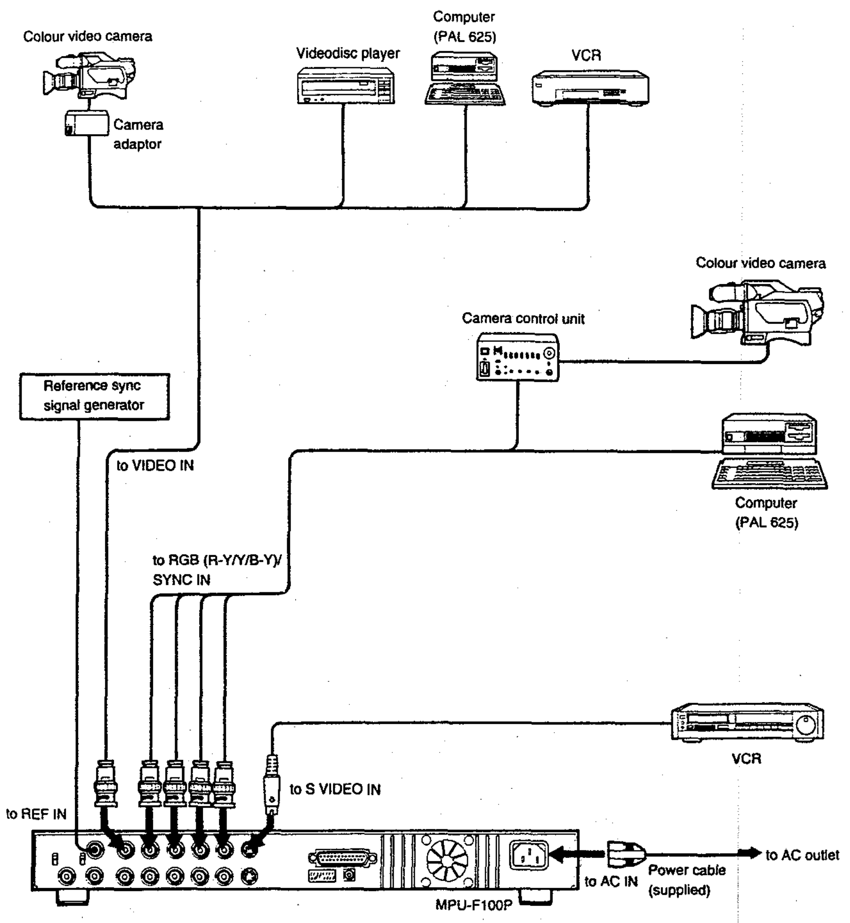
- Connecting source signal equipment
- Connecting a monitor
- Connecting a house sync line
- Connecting a computer

Notes on connection

- Connect the power cable last.
- Disconnect the power cable after you turn off the POWER switch.
- Be sure to plug in each connector securely. Loose connection may cause a malfunction of the system.

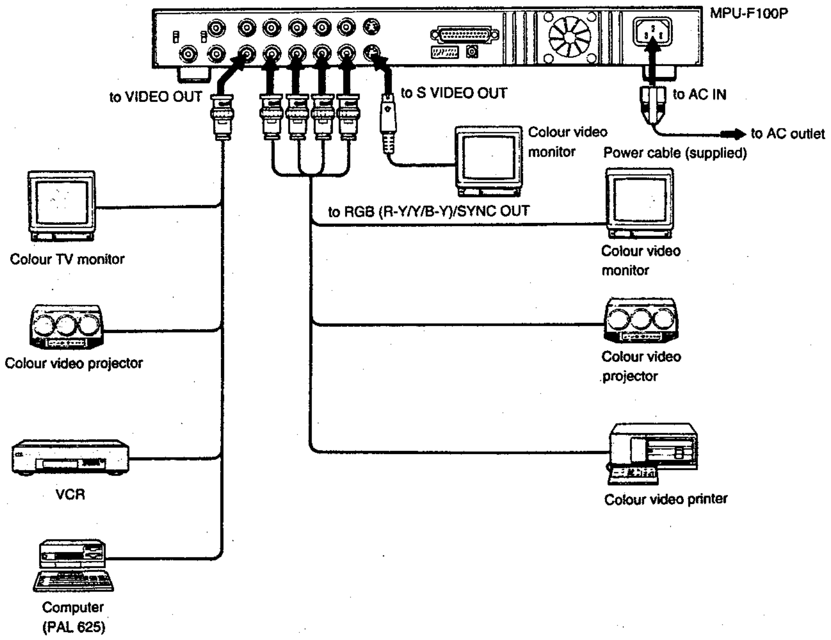
Equipment Connected to the Inputs

You can connect the following video sources and reference sync signal generator to the inputs of the MPU-F100P.


Colour video camera
Camera adaptor
Videodisc player
Computer (PAL 625)
VCR
Colour video camera
Camera control unit
Reference sync signal generator
Computer (PAL 625)
to VIDEO IN
to RGB (R-Y/Y/B-Y)/ SYNC IN
VCR
to S VIDEO IN
to REF IN
to AC outlet
Power cable (supplied)
to AC IN
MPU-F100P

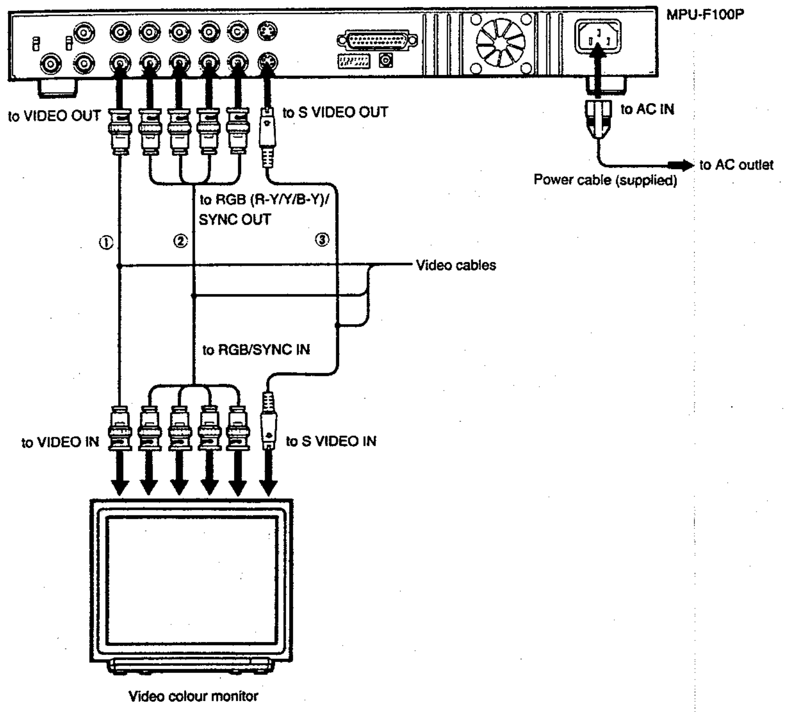
Equipment Connected to the Outputs

You can connect the following equipment to the output connectors of the MPU-F100P.


MPU-F100P
to VIDEO OUT
to S VIDEO OUT
to AC IN
to AC outlet
Colour video monitor
Power cable (supplied)
to RGB (R-Y/Y/B-Y)/SYNC OUT
Colour TV monitor
Colour video monitor
Colour video projector
Colour video projector
VCR
Colour video printer
Computer (PAL 625)

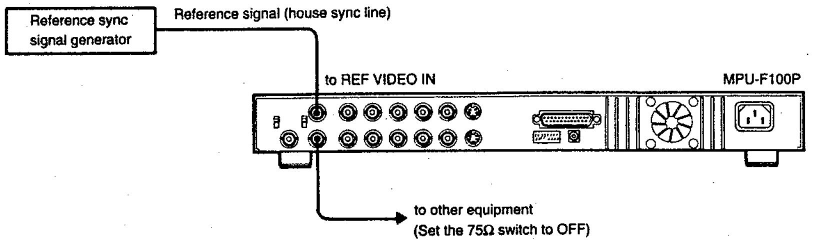
Connecting a Monitor

Connect a monitor for displaying the pictures output from the MPU-F100P. The monitor can be connected to either VIDEO OUT connector ①, RGB (R-Y/Y/B-Y)/SYNC OUT connectors ② or S VIDEO OUT connector ③.


MPU-F100P
to VIDEO OUT
to S VIDEO OUT
to AC IN
to AC outlet
Power cable (supplied)
to RGB (R-Y/Y/B-Y)/
SYNC OUT
①
②
③
Video cables
to RGB/SYNC IN
to VIDEO IN
to S VIDEO IN
Video colour monitor

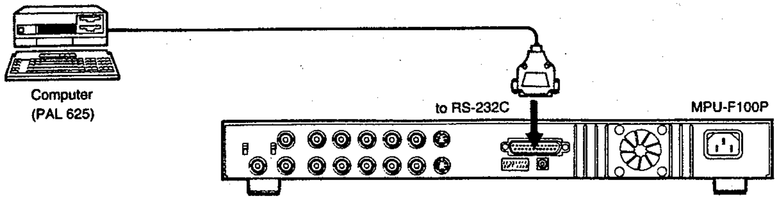
Connecting a House Sync Line

Connect the MPU-F100P to the house sync line at studios.
For distributing the reference signal to the other equipment, use either REF connector for loop-through output and set the 75Ω switch to OFF.


Reference sync signal generator
Reference signal (house sync line)
to REF VIDEO IN
MPU-F100P
to other equipment
(Set the 75Ω switch to OFF)

Connecting a Computer

Connect a computer having an RS-232C connector for external computer control.


Computer
(PAL 625)
to RS-232C
MPU-F100P

1-12. RACK MOUNTING

The MPU-F100P can be mounted in an EIA standard 19-inch rack.

Note on rack mounting

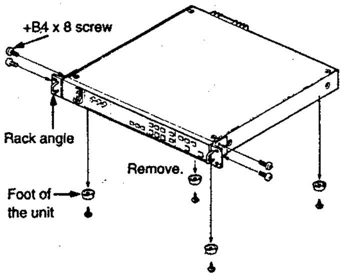
If the MPU-F100P is loaded over 5 kg (11 lb) of weight when wiring or removal, be sure to use the brackets recommended by the rack.

Parts to be used (supplied with the MPU-F100P)

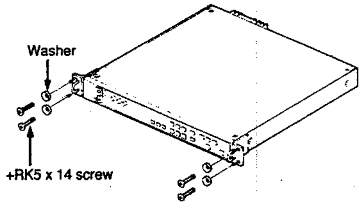
Rack angles (2)	Washers (4)	Phillips-head screws (4) (+RK5 x 14)	Phillips-head screws (4) (+B4 x 8)

1 Fix the rack angles to the MPU-F100P with the +B4 x 8 screws (supplied).

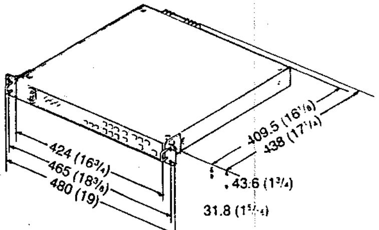
Remove the feet from the bottom of the unit, if necessary.


+B4 x 8 screw
Rack angle
Remove.
Foot of the unit

2 Mount the MPU-F100P in the rack with the washers and the +RK5 x 14 screws.


Washer
+RK5 x 14 screw

Dimensions when parts attached


424 (16 3/4)
465 (18 3/8)
480 (19)
409.5 (16 1/8)
438 (17 1/4)
43.6 (1 3/4)
31.8 (1 1/4)

unit in mm (inch)

1-13. TROUBLESHOOTING GUIDE

Symptoms	Cause/remedy
The MPU-F100P does not turn on when the POWER switch is ON.	The power cable is not connected securely.
The INPUT SELECT indicator blinks in 0.5 second cycle.	The ventilation fan is in trouble. Consult your nearest Sony dealer.
The INPUT SELECT indicator blinks in 1 second cycle.	Signal is not supplied to the input connector selected. Check the source equipment.
The screen does not show the live picture but it shows the picture grabbed last, even though the MEMORY IN indicator is off.	The input signal is not supplied. Check the source equipment.

1-14. INTRODUCTION (INTERFACE MANUAL)

This manual explains how to control the Sony MPU-F100P Simplified Time Base Corrector from a computer connected through the RS-232C serial interface. To take fullest possible advantage of the MPU-F100P's many features, always refer to this manual when writing control programs for the MPU-F100P.

1-15. CONTROLLING THE MPU-F100P (INTERFACE MANUAL)

You can use any of the following methods to control the MPU-F100P:

- Control from the MPU-F100P control panel
- External control using the RS-232C serial interface
- Control through the EXT CONTR connector

This manual describes procedures for controlling the MPU-F100P through the RS-232C serial interface from an external computer.

Controlling operation of the MPU-F100P from an external computer

External control of MPU-F100P operation requires sending the EXT. CPU REMOTE ON (87h) command from the computer to place the MPU-F100P in the remote ON state. External control of the MPU-F100P is possible only in this state.

Note

- While the MPU-F100P is in the remote ON state, the control panel's INPUT SELECT, and PICTURE EFFECT keys and all keys used for grabbing pictures (FRAME, FIELD EVEN, FIELD ODD, MEMORY IN, and CLEAR) are disabled.
- Although limited external control of the MPU-F100P is possible in the remote OFF state, some commands are not accepted in this state. Therefore, always place the MPU-F100P in the remote ON state before using external control.
- For additional information on communication and control, see pages 12 through 18 in Chapter 2, "Communication."

Types of commands

You can use commands sent through the RS-232C interface to control all of the functions that are available from the front panel of the MPU-F100P. In addition, the following functions are available when using external control.

- Status read-out (by the STATUS 1-4 INQ commands)
- Direct specification of mosaic level (by the MOSAIC DIRECT command)
- Direct specification of posterization level (by the POSTERIZATION DIRECT command)
- Direct specification of the MULTI display area (by the MULTI DIRECT command)
- Display muting (by the MUTE ON and MUTE OFF commands)

The external control commands are divided into three categories as follows.

- **1-word commands**
  - CANCEL
  - CLEAR
  - EXT. CPU REMOTE ON
  - EXT. CPU REMOTE OFF
  - FIELD EVEN ON
  - FIELD ODD ON
  - FRAME ON
  - LAP DISSOLVE ON
  - LAP DISSOLVE OFF
  - MEMORY IN
  - MOSAIC
  - MULTI
  - MULTI SET
  - MUTE ON
  - MUTE OFF
  - PICTURE EFFECT+
  - PICTURE EFFECT−
  - PICTURE EFFECT OFF
  - POSTERIZATION
  - RGB/COMPONENT ON
  - S VIDEO ON
  - VIDEO ON

  With these commands, the MPU-F100P returns an ACK character (8Dh) upon receiving one word. If it is in the ready state, the MPU-F100P then performs the relevant operation.

- **2-word commands**
  - MOSAIC DIRECT
  - MULTI DIRECT
  - POSTERIZATION DIRECT

  With these commands, operation is completed immediately upon receiving the relevant two words of data code.

- **INQ commands**
  - STATUS 1 INQ
  - STATUS 2 INQ
  - STATUS 3 INQ
  - STATUS 4 INQ

  These commands are used for interrogating the MPU-F100P to determine its status. The MPU-F100P returns one word of data in response to each of these commands.

The table on the next page summarizes the external control commands. See Chapter 3, "MPU-F100P Control Commands" for details on individual commands.

MPU-F100P RS-232C COMMAND LIST

▨ return code

L \ H	0	1	5	6	8	D	E	F
0	1					FIELD ODD ON	PICTURE EFFECT−	POSTERIZATION
1						STATUS 1 INQ		POSTER DIRECT
2	2	0		VIDEO ON		FIELD EVEN ON	MEMORY IN	MOSAIC
3						STATUS 2 INQ	MUTE ON	MOSAIC DIRECT
4	3			RGB/ COMPONENT ON		FRAME ON		
5						STATUS 3 INQ	MUTE OFF	
6	4					LAP DISSOLVE ON	CLEAR	
7					EXT. CPU REMOTE ON	STATUS 4 INQ		
8	5			S VIDEO ON		LAP DISSOLVE OFF		
9			CANCEL		EXT. CPU REMOTE OFF			
A	6						MULTI	
B							MULTI DIRECT	
C	7					PICTURE EFFECT OFF	MULTI SET	
D					ACK			
E	8					PICTURE EFFECT+		
F					NAK			

1-16. COMMUNICATION THROUGH THE RS-232C INTERFACE (INTERFACE MANUAL)

Outline

The term 'RS-232C' refers to an EIA standard defining connection for communication between modems and terminal devices. With this interface standard, data is transferred serially, one bit at a time.

The RS-232C interface is used for a wide variety of purposes by nearly all personal computers. It is also provided on the MPU-F100P, with the corresponding connector located on the unit's rear panel.

Signal Connections

Signals used by the MPU-F100P's serial interface are as shown in the following table.

Pin No.	Symbol	Signal name	Signal direction
1	FG	Frame ground	
2	TxD	Transmit data	EXT. CPU ←—— MPU-F100P
3	RxD	Receive data	EXT. CPU ——→ MPU-F100P
4	RTS	Request to send	EXT. CPU ←—— MPU-F100P
5	CTS	Clear to send	EXT. CPU ——→ MPU-F100P
6	DSR	Data set ready	EXT. CPU ——→ MPU-F100P
20	DTR	Data terminal ready	EXT. CPU ←—— MPU-F100P
7	GND	Signal ground	

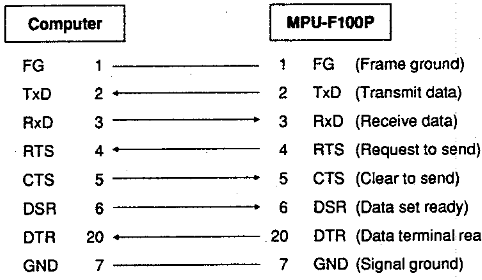
All signals conform to the RS-232C standard. (Output level is +5V or greater when ON, and -5V or less when OFF.)

Standard and 'Null Modem' Cables

The MPU-F100P is set to use the computer's serial interface as a terminal device. The cable that is used for connecting the MPU-F100P to the computer will differ depending on whether the RS-232C interface of the computer is set up for connection to a modem (DTE, or Data Terminal Equipment), or to a terminal (DCE, or Data Communication Equipment). **Be sure to check the computer's RS-232C pin assignments to determine the type of setup.**

Connection with a Standard Cable

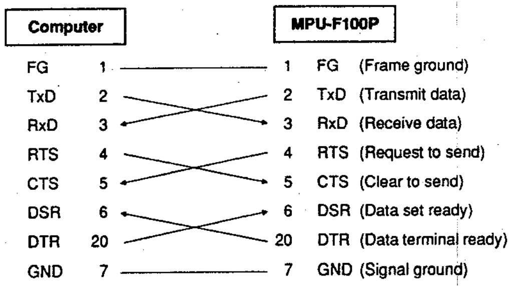
If the computer's RS-232C interface is configured as data communication equipment, a standard cable is required for connection. Cable connections are as follows.


Computer
MPU-F100P
FG 1
TxD 2
RxD 3
RTS 4
CTS 5
DSR 6
DTR 20
GND 7
1 FG (Frame ground)
2 TxD (Transmit data)
3 RxD (Receive data)
4 RTS (Request to send)
5 CTS (Clear to send)
6 DSR (Data set ready)
20 DTR (Data terminal ready)
7 GND (Signal ground)

Connection with a Null Modem Cable

If the computer's RS-232C interface is configured as data terminal equipment, a 'null modem' cable is required because no modem exists in the link.

The difference between the null modem cable and the standard cable is that certain pins are cross-connected. Cable connections are as follows.


Computer
MPU-F100P
FG 1
TxD 2
RxD 3
RTS 4
CTS 5
DSR 6
DTR 20
GND 7
1 FG (Frame ground)
2 TxD (Transmit data)
3 RxD (Receive data)
4 RTS (Request to send)
5 CTS (Clear to send)
6 DSR (Data set ready)
20 DTR (Data terminal ready)
7 GND (Signal ground)

Note

- With the IBM PC/AT's 9-pin connector, pin assignments are:
  - 1-FG 4-DTR 7-RTS
  - 2-RxD 5-GND 8-CTS
  - 3-TxD 6-DSR

Data Format

The MPU-F100P's data format is preset as follows.

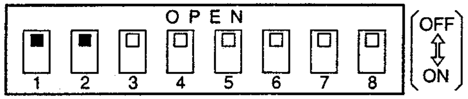
Mode : Asynchronous
Character length : 8 bits
Baud rate : 9600 bps
Parity : None
Stop bits : 1 bit
Bit sequence : Lowest bit first

Changing the data format

To change the baud rate, use positions SW1 and SW2 of the DIP switch on the MPU-F100P's rear panel as follows. Other format parameters (mode, character length, parity, and stop bits) are fixed and cannot be changed.

Selecting the baud rate

Selectable baud rates are 1200, 2400, 4800, and 9600 bps. Using the DIP switch on the MPU-F100P's rear panel, select the baud rate that matches that of the computer's RS-232C interface as follows.



Baud rate (bps)	SW1	SW2
1200	OFF	OFF
2400	ON	OFF
4800	OFF	ON
9600	ON	ON

Note:

- The factory setting of the baud rate is 9600 bps.

1-17. COMMUNICATION PROTOCOL (INTERFACE MANUAL)

The MPU-F100P uses software handshaking for communication with the computer. Upon receiving each byte from the computer, the MPU-F100P returns a 1-byte code (ACK, NAK, or a status byte) to the computer. The computer receives the 1-byte code, then sends subsequent code to the MPU-F100P. This sequence forms the basic RS-232C communication protocol between the MPU-F100P and the computer. The communication protocol uses the following return codes for handshaking.

ACK (8Dh)

Upon receiving a valid command from the computer, the MPU-F100P returns an ACK character (Acknowledge, 8Dh) to the computer to signal that it is ready to receive subsequent code.

NAK (8Fh)

If the MPU-F100P cannot accept a received command, it returns a NAK character (No Acknowledge, 8Fh) to the computer. Return of a NAK indicates either that the MPU-F100P is not ready to receive commands, or that it received an undefined command. In such situations, check the validity of commands sent to the unit.

Exception to Communication Handshaking Format

Upon receiving a STATUS 1 INQ, STATUS 2 INQ, STATUS 3 INQ, or STATUS 4 INQ inquiry code, the MPU-F100P returns a 1-byte code indicating the unit's status, but does not return an ACK or NAK character.

Command Execution Time

The command execution time is the interval between receipt of a command and (if the command is a valid one) return of an ACK code and switchover to the mode specified by that command.

Command execution and return code transmission by the MPU-F100P take place over a period lasting approximately 20 msec, as shown in Figure 2-1 below.

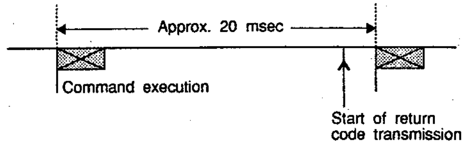

Approx. 20 msec
Command execution
Start of return code transmission

Fig. 2-1 Timing of command execution

Accordingly, at 1200 baud, the MPU-F100P might complete execution of 1-word command before it completes transmission of ACK transmission, as shown in Figure 2-2.

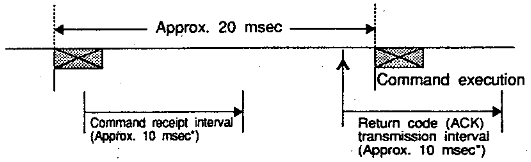

Approx. 20 msec
Command execution
Command receipt interval (Approx. 10 msec*)
Return code (ACK) transmission interval (Approx. 10 msec*)

Fig. 2-2

(*When baud rate is 1200 bps)

Under certain circumstances, the MPU-F100P will not accept multiple commands in succession. This occurs when the second of two successive commands is received before the start of transmission of the ACK code in response to the first command. ACK transmission (which takes place at the fixed timing shown in Figure 2-1) must start before the MPU-F100P receives the latter command. Otherwise, the MPU-F100P does not accept the second command and does not send a return code in response to the second command.

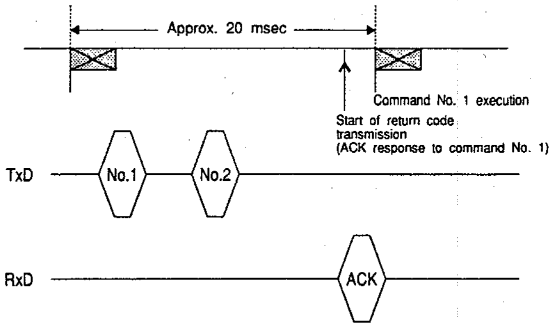

Approx. 20 msec
Command No. 1 execution
Start of return code transmission
(ACK response to command No. 1)
TxD
No.1
No.2
RxD
ACK

Fig. 2-3

In order to ensure proper operation, write all control programs so that the computer never sends a command until it receives a response to the preceding command from the MPU-F100P.

1-18. TURNING ON THE POWER (INTERFAC MANUAL)

Observe the following procedures when turning on the power.

1. Connect the interface cable to the RS-232C connectors on the MPU-F100P and the computer.
2. Initialize the RS-232C port on the computer.
3. Turn on the MPU-F100P's power.
4. Send the EXT. CPU REMOTE ON (87h) command from the computer to place the MPU-F100P in the remote ON state. (The REMOTE indicator lights.)

Note

- While the MPU-F100P is in the remote ON state, the control panel's INPUT SELECT, and PICTURE EFFECT keys and all keys used for grabbing pictures (FRAME, FIELD EVEN, FIELD ODD, MEMORY IN, and CLEAR) are disabled.
- Although external control is also possible while the MPU-F100P is in the remote OFF state, some commands are not accepted. Therefore, always place the unit in the remote ON state when using external control.

Switching to the manual mode

Send the EXT.CPU REMOTE OFF (89h) command from the host to the MPU-F100P when you wish to switch from the remote ON state to the remote OFF state without turning off the power.

Note

- Disconnecting the interface cable from the RS-232C connectors does not switch control back to the remote OFF state.

Troubleshooting

1. If you experience problems with RS-232C communication, use an RS-232C line tester to diagnose the problem. A Tektronix Model 834 or 834R is recommended.
2. If a Tektronix tester is not available, use the following procedure.
   (a) Verify that the baud rate, stop bits, character length, and baud rate factor are correctly set on the computer.
   (b) Verify that the voltage on the TxD and RxD lines is less than –8V.
   (c) Send data to the MPU-F100P from the computer and verify that the voltage of the TxD and RxD lines is greater than +8V.

1-19. BASIC COMMANDS (INTERFACE MANUAL)

Numeric Commands 0-8 (12h, 00h, 02h, 04h, 06h, 08h, 0Ah, 0Ch, 0Eh)

The hexadecimal numbers 12h, 00h, 02h, 04h, 06h, 08h, 0Ah, 0Ch, and 0Eh are numeric values that are used for setting parameters with the following commands.

· MOSAIC DIRECT (F3h)	Direct specification of the mosaic level
· MULTI DIRECT (EBh)	Direct specification of the multi-display position
· POSTERIZATION DIRECT (F1h)	Direct specification of the posterization level

Data	Command
0	12h
1	00h
2	02h
3	04h
4	06h

Data	Command
5	08h
6	0Ah
7	0Ch
8	0Eh

Note

- The range of levels that can be specified with each of the above commands is as indicated in the table below. Specification of levels outside the indicated ranges will result in return of a NAK from the MPU-F100P and termination of the direct mode.

Command	Range
MOSAIC DIRECT	0 to 4
MULTI DIRECT	0 to 8
POSTERIZATION DIRECT	0 to 3

- Positions in the multi-display screen are numbered as follows.

0	1	2
3	4	5
6	7	8

- For details, see the explanations of the individual commands.

ACK (8Dh)

Valid command receipt acknowledgement

The MPU-F100P returns this code to the computer to acknowledge receipt of a valid command and to signal that it is ready to accept the next command.
ACK is a code returned by the MPU-F100P, and is not an executable command.

CANCEL (59h)

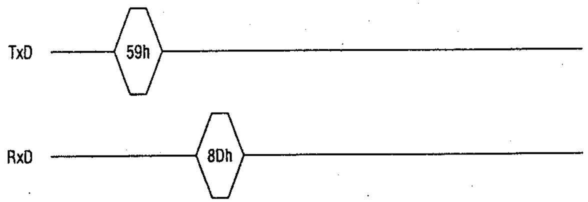
Cancel direct command

The CANCEL command is used to abort execution of the MOSAIC DIRECT (F3h), MULTI DIRECT (EBh), or POSTERIZATION DIRECT (F1h) direct commands. Upon receiving this command, the MPU-F100P returns ACK and cancels all of these direct commands.

Note

- If no direct command is being executed, the MPU-F100P returns ACK in response to the CANCEL command, but no change in status takes place.

Program example



CLEAR (E6h)

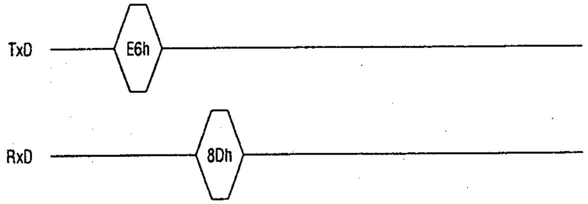
Cancel grab

The CLEAR command is used to cancel the MPU-F100P's MEMORY IN (image storage) state. The MPU-F100P returns ACK in response to this command.

Note

- If memory does not contain any image, the MPU-F100P returns ACK in response to this command but no change in status takes place.

Program example



EXT. CPU REMOTE ON (87h)

Remote ON

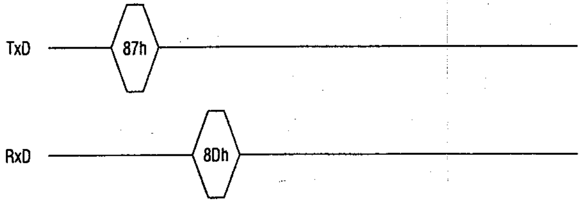
The EXT. CPU REMOTE ON command places the MPU-F100P in the remote ON state. Upon receiving this command, the MPU-F100P returns ACK and disables the INPUT SELECT, and PICTURE EFFECT keys and all keys used for grabbing pictures (FRAME, FIELD EVEN, FIELD ODD, MEMORY IN, and CLEAR).

You can find out whether the MPU-F100P is in the remote ON state by checking bit 7 of status byte 1 with the STATUS 1 INQ command.

Note

- Although external control is also possible while the MPU-F100P is in the remote OFF state, some commands are not accepted. Therefore, always place the unit in the remote ON state when using external control.
- The MPU-F100P accepts the EXT.CPU REMOTE ON command at any time.
- When the power is turned on, MPU-F100P operation starts in the remote OFF state.

Program example



EXT. CPU REMOTE OFF (89h)

Remote OFF

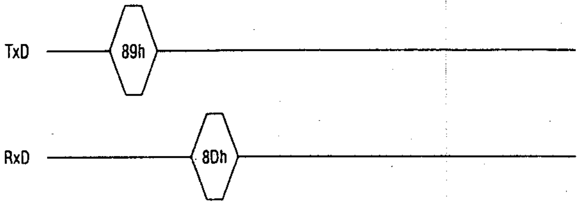
The EXT. CPU REMOTE OFF command places the MPU-F100P in the remote OFF state. Upon receiving this command, the MPU-F100P returns ACK to the computer.

You can find out whether the MPU-F100P is in the remote ON state by checking status bit 7 with the STATUS 1 INQ command.

Note

- Upon switching from the remote ON state to the remote OFF state, INPUT SELECT, and LAP DISSOLVE revert to the states set by the keys on the MPU-F100P's front panel. If display muting has been turned on with the MUTE ON (E3h) command, it reverts to the MUTE OFF state.
- The MPU-F100P accepts the EXT.CPU REMOTE OFF command at any time.
- When the power is turned on, MPU-F100P operation starts in the remote OFF state.

Program example



FIELD EVEN ON (D2h)

Select grab mode - FIELD EVEN

The FIELD EVEN ON command switches the grab mode to FIELD EVEN.

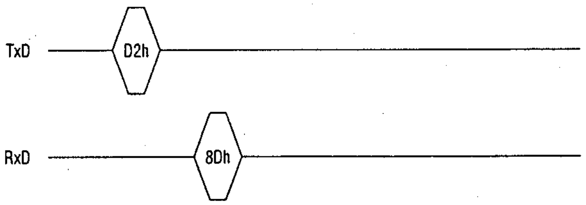
The MPU-F100P provides three grab modes: FIELD EVEN, FIELD ODD, and FRAME. The other two grab modes can be selected with the FIELD ODD ON (D0h) and FRAME ON (D4h) commands. The FIELD EVEN mode is automatically cancelled whenever another mode is selected.

Upon receiving this command, the MPU-F100P returns ACK to the computer.

Note

- This command is valid even if no display has been grabbed with the MEMORY IN (E2h) command.
- When the power is turned on, MPU-F100P operation starts in the FRAME mode.

Program example



FIELD ODD ON (D0h)

Select grab mode - FIELD ODD

The FIELD ODD ON command switches the grab mode to FIELD ODD.

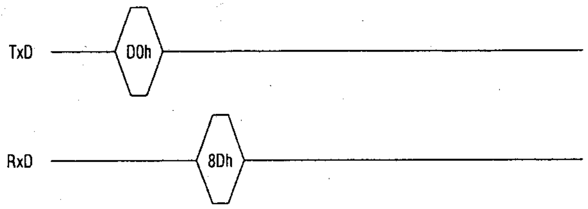
The MPU-F100P provides three grab modes: FIELD EVEN, FIELD ODD, and FRAME. The other two grab modes can be selected with the FIELD EVEN ON (D2h) and FRAME ON (D4h) commands. The FIELD ODD mode is automatically cancelled whenever another mode is selected.

Upon receiving this command, the MPU-F100P returns ACK to the computer.

Note

- This command is valid even if no display has been grabbed into memory with the MEMORY IN (E2h) command.
- When the power is turned on, MPU-F100P operation starts in the FRAME mode.

Program example



FRAME ON (D4h)

Select grab mode - FRAME

The FRAME ON command switches the grab mode to FRAME.

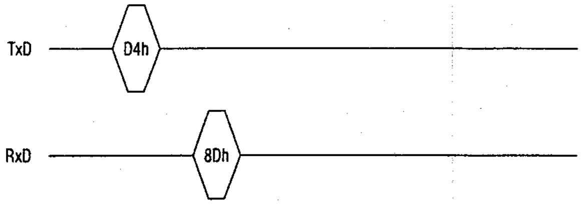
The MPU-F100P provides three grab modes: FIELD EVEN, FIELD ODD, and FRAME. The other two grab modes can be selected with the FIELD EVEN ON (D2h) and FIELD ODD ON (D0h) commands. The FRAME mode is automatically cancelled whenever another mode is selected.

Upon receiving this command, the MPU-F100P returns ACK to the computer.

Note

- This command is valid even if no display has been grabbed into memory with the MEMORY IN (E2h) command.
- When the power is turned on, MPU-F100P operation starts in the FRAME mode.

Program example



LAP DISSOLVE ON (D6h)

Lap dissolve mode ON

The LAP DISSOLVE ON command turns on the MPU-F100P's lap dissolve function. This command is valid only when the MPU-F100P is in the remote ON state.

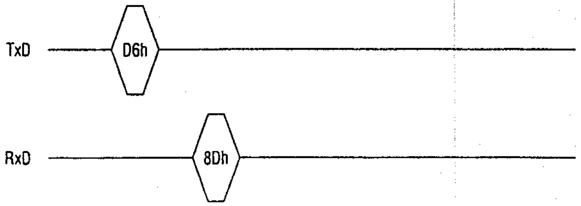
The lap dissolve function can be used together with other special effect functions, such as the mosaic function and the posterization function.

Upon receiving this command, the MPU-F100P returns ACK to the computer.

Note

- If the MPU-F100P receives this command while in the remote OFF state, it returns NAK to the computer and disregards the command.
- You can find out whether the MPU-F100P is in the remote ON state by checking bit 7 of status byte 1 with the STATUS 1 INQ command.
- When multi-display is selected as a picture effect, the lap dissolve mode does not function even if it is turned ON.

Program example



LAP DISSOLVE OFF (D8h)

Lap dissolve mode OFF

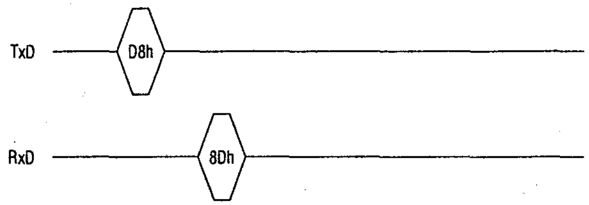
The LAP DISSOLVE OFF command turns off the MPU-F100P's lap dissolve function. This command is valid only when the MPU-F100P is in the remote ON state.

Upon receiving this command, the MPU-F100P returns ACK to the computer.

Note

- If the MPU-F100P receives this command while in the remote OFF state, it returns NAK to the computer and disregards the command.
- You can find out whether the MPU-F100P is in the remote ON state by checking bit 7 of status byte 1 with the STATUS 1 INQ command.

Program example



MEMORY IN (E2h)

Bring image into memory (Grab)

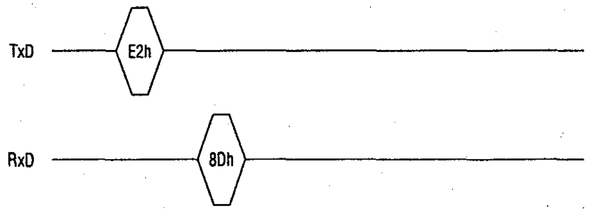
This command is used for bringing an image into memory (for grabbing an image).

Upon receiving this command, the MPU-F100P returns ACK to the computer.

Note

- The type of image output (FIELD ODD, FIELD EVEN, or FRAME) is determined by the currently selected grab mode.
- The current grab mode can be checked with the STATUS 3 INQ command.
- Upon receiving this command, any image currently in memory is replaced with the image currently displayed.

Program example



MOSAIC (F2h)

Mosaic

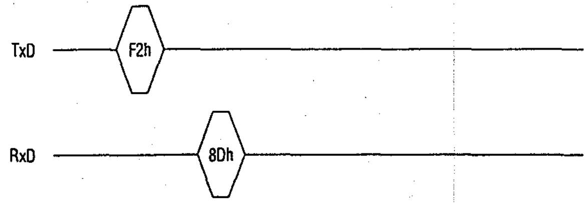
This command turns on the mosaic picture effect.

Upon receiving this command, the MPU-F100P returns ACK to the computer.

Note

- If picture effects are OFF or some other picture effect is currently selected, the mosaic level is set to 0 upon receiving this command.
- If the mosaic effect is currently selected, the MPU-F100P returns ACK upon receiving this command, but no change in status takes place.
- The mosaic level range is from 0 to 4. The level can be changed with the PICTURE EFFECT + (DEh) and PICTURE EFFECT- (E0h) commands. The current mosaic level can be checked with the STATUS 4 INQ command.

Program example



MOSAIC DIRECT (F3h)

Mosaic direct level specification

The MOSAIC DIRECT command is used for directly specifying the level of the mosaic picture effect. This is a 2-word command.

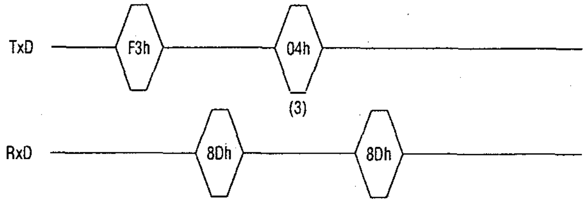
Upon receiving the MOSAIC DIRECT command, the MPU-F100P returns ACK to the computer. Upon subsequently receiving a numeric command (0 to 4) specifying the level, it sends another ACK to the host, then switches the mosaic picture effect to the specified level.

Note

- If the code following the MOSAIC DIRECT command is anything other than a numeric command, the MOSAIC DIRECT command is automatically cancelled and NAK is returned to the computer.
- The MOSAIC DIRECT command is also automatically cancelled and NAK returned to the host if the level specified by the subsequent numeric command is not in the range from 0 to 4.
- If it becomes necessary to cancel the MOSAIC DIRECT command, use the CANCEL (59h) command. The MPU-F100P then returns ACK and cancels the MOSAIC DIRECT command.
- The current level of the mosaic picture effect can be checked with the STATUS 4 INQ command.

Program example

The following sequence sets the mosaic level to 3.



MULTI (EAh)
MULTI SET (ECh)

Multi-display
Multi-display set

Use the MULTI command to switch to multi-picture display (display with the screen partitioned into 9 areas). Upon receiving this command, the MPU-F100P returns ACK, divides the screen into 9 areas, and displays the image in position 0.

Multi-display areas

0	1	2
3	4	5
6	7	8

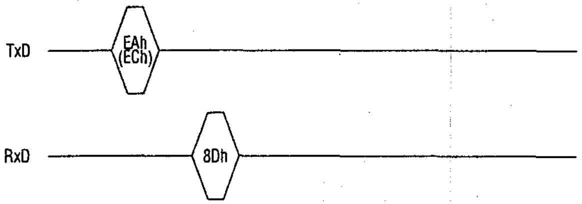
When multi-display is ON, the PICTURE EFFECT+ (DEh) and PICTURE EFFECT- (E0h) commands mute the current display position and advance display to the neighboring position.

Use the MULTI SET command in the multi-display mode to set the image in the current display position (i.e., to stop a moving image). Upon receiving the MULTI SET command, the MPU-F100P returns ACK, sets the image in the current position, and advances display selection to the neighboring position.

Note

- Although the MPU-F100P displays an image in position 0 upon receiving the MULTI command, it mutes display in the other display positions (1 to 8). Therefore, sending this command when multi-display is already active will reset the multi-display mode.
- When images are set in all 9 display positions, the MPU-F100P grabs the images into memory.
- Although the PICTURE EFFECT+, PICTURE EFFECT-, and MULTI SET commands shift display to the neighboring position, the neighboring position is skipped if its image has already been set. Accordingly, the MPU-F100P returns ACK but does not change the display selection if any of these commands is received when all 9 positions have been set.
- If the MPU-F100P receives the MULTI SET command while it is *not* in the multi-display mode, ACK is returned but no change in status takes place.
- You can check the current display position with the STATUS 4 INQ command.
- The lap dissolve function does not work in the multi-display mode.

Program example



MULTI DIRECT (EBh)

Multi-display direct specification

The MULTI DIRECT command directly specifies the display position within the 9 display areas in the multi-display mode. This is a 2-word command. See page 20 concerning specification of the second word.

When the MPU-F100P receives the MULTI DIRECT command, it returns ACK to the computer. Upon subsequently receiving a numeric command (0 to 8) specifying a display position, it also returns ACK in response to the numeric command. The MPU-F100P then then switches to the multi-display mode and displays the in the specified position.

Multi-picture display areas

0	1	2
3	4	5
6	7	8

- When the MPU-F100P receives the MULTI DIRECT command while it is not in the multi-display mode, it switches to the multi-display mode and displays the image in the specified position. Display is muted in all positions other than the one specified.
- When the MULTI DIRECT command is received in the multi-display mode, the image is set in the current display position, then the display position moves to the position specified.
- Since the MULTI DIRECT command sets the image in the current display position, display cannot be muted in that position. However, image display can be muted in the current position by using the following procedure.

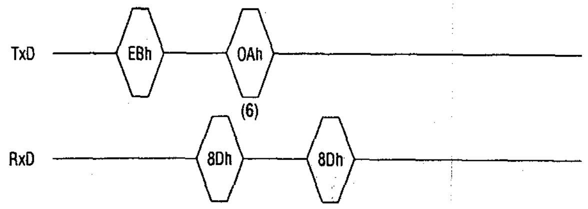
  ① Verify that the MPU-F100P is in the remote ON state.
  ② Send the MUTE ON (E3h) command to the MPU-F100P to mute the current display position.
  ③ Send the MULTI DIRECT command to the MPU-F100P and specify the next display position.
  ④ Send the MUTE OFF (E5h) command to the MPU-F100P. The image then appears in the position specified in step ③.

Note

- If the code following the MULTI DIRECT command is anything other than a numeric command, the MULTI DIRECT command is automatically nullified and NAK is returned to the computer.
- The MULTI DIRECT command is also automatically nullified and NAK returned to the host if the position specified by the subsequent numeric command is not in the range from 0 to 8.
- If it becomes necessary to cancel the MULTI DIRECT command, use CANCEL (59h) command. The MPU-F100P then returns ACK and cancels the MULTI DIRECT command.
- The MULTI DIRECT command can be used to move to a display position even if that position has already been set.
- The current display position can be checked with the STATUS 4 INQ command.
- The lap dissolve function does not work in the multi-display mode.

Program example

The following sequence specifies display position 6.



MUTE ON (E3h)

Mute display ON

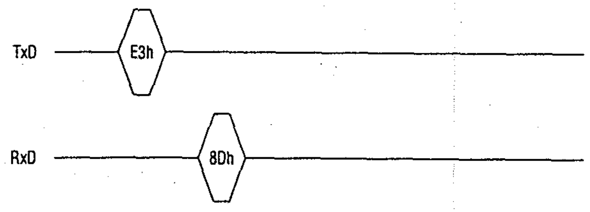
The MUTE ON command turns on mute display. This command is valid only when the MPU-F100P is in the remote ON state.

Upon receiving this command, the MPU-F100P returns ACK to the computer.

Note

- If the MPU-F100P receives this command while in the remote OFF state, it returns NAK to the computer and disregards the command.
- You can find out whether the MPU-F100P is in the remote ON state by checking bit 7 of status byte 1 with the STATUS 1 INQ command.
- If the MPU-F100P is in the MEMORY IN (grab) state, this command does not mute the display. However, display is muted if the MEMORY IN state is cancelled by the CLEAR (E6h) command.
- If multi-display is selected, this command only mutes the only the currently selected display position.
- When display is muted with this command, muting is cancelled upon receiving the EXT.CPU REMOTE OFF (89h) command.

Program example



MUTE OFF (E5h)

Mute display OFF

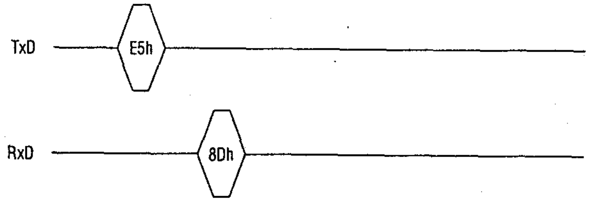
The MUTE OFF command is used to cancel display muting set with the MUTE ON (E3h) command. The command is valid only when the MPU-F100P is in the remote ON state.

Upon receiving this command, the MPU-F100P returns ACK to the computer.

Note

- If the MPU-F100P receives this command while in the remote OFF state, it returns NAK to the computer and disregards the command.
- You can find out whether the MPU-F100P is in the remote ON state by checking bit 7 of status byte 1 with the STATUS 1 INQ command.
- If mute display is already off upon receiving this command, the MPU-F100P returns ACK but no change in status takes place.

Program example



NAK (8Fh)

Negative acknowledgement of command receipt

The MPU-F100P returns this code to the computer to notify the host that it could not accept a command. This indicates either that the MPU-F100P is currently not ready to receive commands, or that the command sent was not a valid one. (Check correctness of the command.)

NAK is a code returned by the MPU-F100P, and is not an executable command.

PICTURE EFFECT+ (DEh)
PICTURE EFFECT– (E0h)

Picture effect level+
Picture effect level –

The PICTURE EFFECT+ and PICTURE EFFECT– commands are used for changing the level of picture effects produced by the mosaic and posterization functions, and for changing the display position during multi-display.

Upon receiving these commands, the MPU-F100P returns ACK to the computer.

Note

- The following table shows the range of levels or display positions that can be specified for relevant functions.

Picture effect	Level range
Mosaic	0 to 4
Posterization	0 to 3
Multi-display	0 to 8

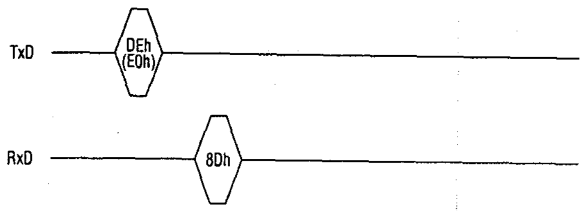
- When the mosaic or posterization picture effect is selected and set to level 0, the MPU-F100P returns ACK in response to the PICTURE EFFECT- command, but no change in status takes place. Likewise, when the maximum level (3 or 4) is set, the MPU-F100P returns ACK in response to the PICTURE EFFECT+ command, but status remains unchanged.
- When multi-display is selected as the picture effect and the display position is set to 0, the PICTURE EFFECT- command changes the display position to 8. When the display position is 8 and the PICTURE EFFECT+ command is received, the display position changes to 0.

Multi-display areas

0	1	2
3	4	5
6	7	8

- If all picture effects are OFF upon receiving these commands, ACK is returned but no change in status takes place.

Program example



PICTURE EFFECT OFF (DCh)

Picture effect OFF

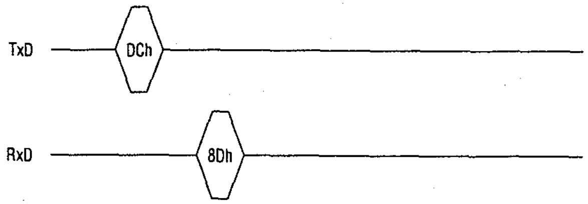
The PICTURE EFFECT OFF command cancels all picture effects (the mosaic, posterization, and multi-display effects).

Upon receiving this command, the MPU-F100P returns ACK to the computer.

Note

- When picture effects are turned off, the MPU-F100P returns ACK in response to the PICTURE EFFECT OFF command, but no change in status takes place.

Program example



POSTERIZATION (F0h)

Posterization

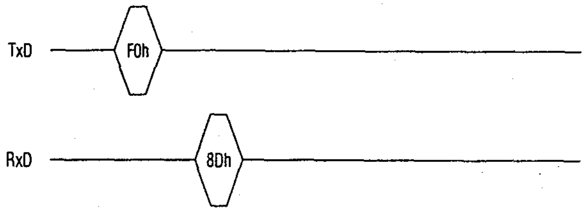
The POSTERIZATION command turns on the screen posterization (solarization) function.

Upon receiving this command, the MPU-F100P returns ACK to the computer.

Note

- If picture effects are OFF or some other picture effect is currently selected, the posterization level is set to 0 upon receiving this command.
- If posterization is currently selected, the MPU-F100P returns ACK upon receiving this command, but no change in status takes place.
- The posterization level range is from 0 to 3. The level can be changed with the PICTURE EFFECT + (DEh) and PICTURE EFFECT- (E0h) commands. The current posterization level can be checked with the STATUS 4 INQ command.

Program example



POSTERIZATION DIRECT (F1h)

Posterization direct level specification

The POSTERIZATION DIRECT command is used for directly specifying the level of the posterization (solarization) picture effect. This is a 2-word command.

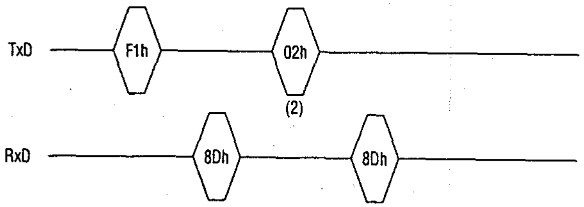
Upon receiving the POSTERIZATION DIRECT command, the MPU-F100P returns ACK to the computer. Upon subsequently receiving a numeric command (0 to 3) specifying the level, it sends another ACK to the host, then switches the posterization picture effect to the specified level.

Note

- If the code following the POSTERIZATION DIRECT command is anything other than a numeric command, the POSTERIZATION DIRECT command is automatically nullified and NAK is returned to the computer.
- The POSTERIZATION DIRECT command is also automatically nullified and NAK returned to the host if the level specified by the subsequent numeric command is not in the range from 0 to 3.
- If it becomes necessary to cancel the POSTERIZATION DIRECT command, use the CANCEL (59h) command. The MPU-F100P then returns ACK and cancels the POSTERIZATION DIRECT command.
- You can check the current posterization level with the STATUS 4 INQ command.

Program example

The following sequence sets the posterization level to 2.



RGB/COMPONENT ON (64h)

Input selection - RGB/COMPONENT signal

The RGB/COMPONENT ON command is used for selecting RGB/COMPONENT (Y/R-Y/B-Y) as the MPU-F100P input signal. This command is effective only when the MPU-F100P is in the remote ON state.

The MPU-F100P also has VIDEO and S VIDEO inputs. If one of these inputs is selected with the VIDEO ON (62h) or S VIDEO ON (68h) commands, the RGB/COMPONENT input is automatically switched OFF.

Upon receiving this command, the MPU-F100P returns ACK to the computer.

Note

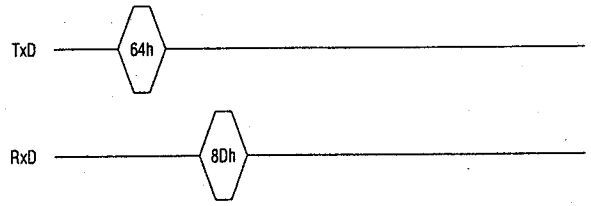
- If the MPU-F100P receives this command while in the remote OFF state, it returns NAK to the computer and disregards the command.
- You can find out whether the MPU-F100P is in the remote ON state by checking bit 7 of status byte 1 with the STATUS 1 INQ command.
- Whether this command selects RGB input or COMPONENT input depends on the setting of DIP SW5 on the rear panel. Settings are as follows:

DIP SW5

ON	RGB
OFF	COMPONENT

- You can find out whether DIP SW5 is set for RGB or COMPONENT by checking bit 3 of status byte 2 with the STATUS 2 INQ command.

Program example



VIDEO ON (62h)

Input selection - VIDEO signal

This command is used to select the VIDEO input as the MPU-F100P's input signal source. This command is effective only when the MPU-F100P is in the remote ON state.

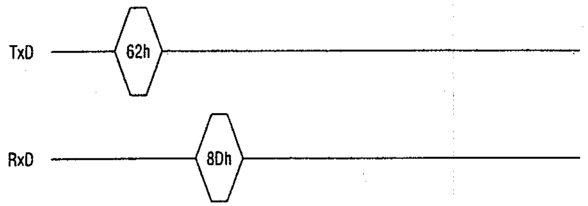
The MPU-F100P also accepts S VIDEO and RGB/COMPONENT signal input. Either of these can be selected using the S VIDEO ON (68h) or RGB/COMPONENT ON (64h) commands. When another source is selected, the VIDEO input is automatically turned OFF.

Upon receiving this command, the MPU-F100P returns ACK to the computer.

Note

- If the MPU-F100P receives this command while in the remote OFF state, it returns NAK to the computer and disregards the command.
- You can find out whether the MPU-F100P is in the remote ON state by checking bit 7 of status byte 1 with the STATUS 1 INQ command.

Program example



S VIDEO ON (68h)

Input selection - S VIDEO signal

This command is used to select the S VIDEO input as the MPU-F100P's input signal source. This command is effective only when the MPU-F100P is in the remote ON state.

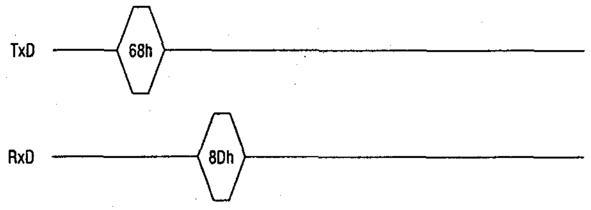
The MPU-F100P also accepts VIDEO and RGB/COMPONENT signal input. Either of these can be selected using the VIDEO ON (62h) or RGB/COMPONENT ON (64h) commands. When another source is selected, the S VIDEO input is automatically turned OFF.

Upon receiving this command, the MPU-F100P returns ACK to the computer.

Note

- If the MPU-F100P receives this command while in the remote OFF state, it returns NAK to the computer and disregards the command.
- You can find out whether the MPU-F100P is in the remote ON state by checking bit 7 of status byte 1 with the STATUS 1 INQ command.

Program example



STATUS 1 INQ (D1h)
STATUS 2 INQ (D3h)
STATUS 3 INQ (D5h)
STATUS 4 INQ (D7h)

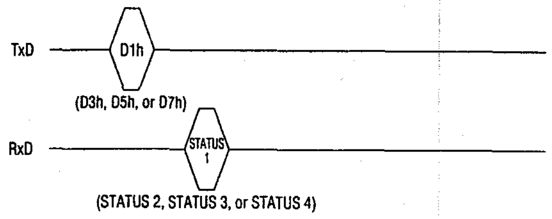
Status 1 inquiry
Status 2 inquiry
Status 3 inquiry
Status 4 inquiry

The STATUS 1 INQ, STATUS 2 INQ, STATUS 3 INQ, and STATUS 4 INQ commands request status information from the MPU-F100P. Upon receiving any of these commands, the MPU-F100P returns a 1-byte status code (STATUS 1, STATUS 2, STATUS 3, or STATUS 4) instead of ACK.

Contents of the various status bytes are as shown on the following pages.

Use of the STATUS INQ commands is recommended both before and after sending other commands to confirm that the MPU-F100P is in the remote ON state and that operations are carried out properly. The STATUS INQ commands can be used at any time.

Program example



STATUS 1

b7	REMOTE ON	1: Remote ON state 0: Remote OFF state
b6	BUSY	1: Mode transition in progress 0: Mode transition not in progress
b5	———	Reserved
b4	Cooling fan motor state	1: Cooling fan motor abnormality state 0: Cooling fan motor normal state
b3	Input signal state	1: Selected signal state is normal 0: Selected signal state is abnormal
b2	———	Reserved
b1	———	Reserved
b0	———	Reserved

STATUS 2

b7	———		Reserved
b6	———		Reserved
b5	———		Reserved
b4	———		Reserved
b3	COMPONENT/$\overline{\text{RGB}}$ (DIP SW5 setting)		1: COMPONENT (Y/R-Y/B-Y) selected 0: RGB selected (Note: b3 is significant only when b2 is '1'.)
b2	INPUT SELECT	RGB/ COMPONENT	'1' when RGB/COMPONENT input is selected.
b1		S VIDEO	'1' when S VIDEO input is selected.
b0		VIDEO	'1' when VIDEO input is selected.

STATUS 3

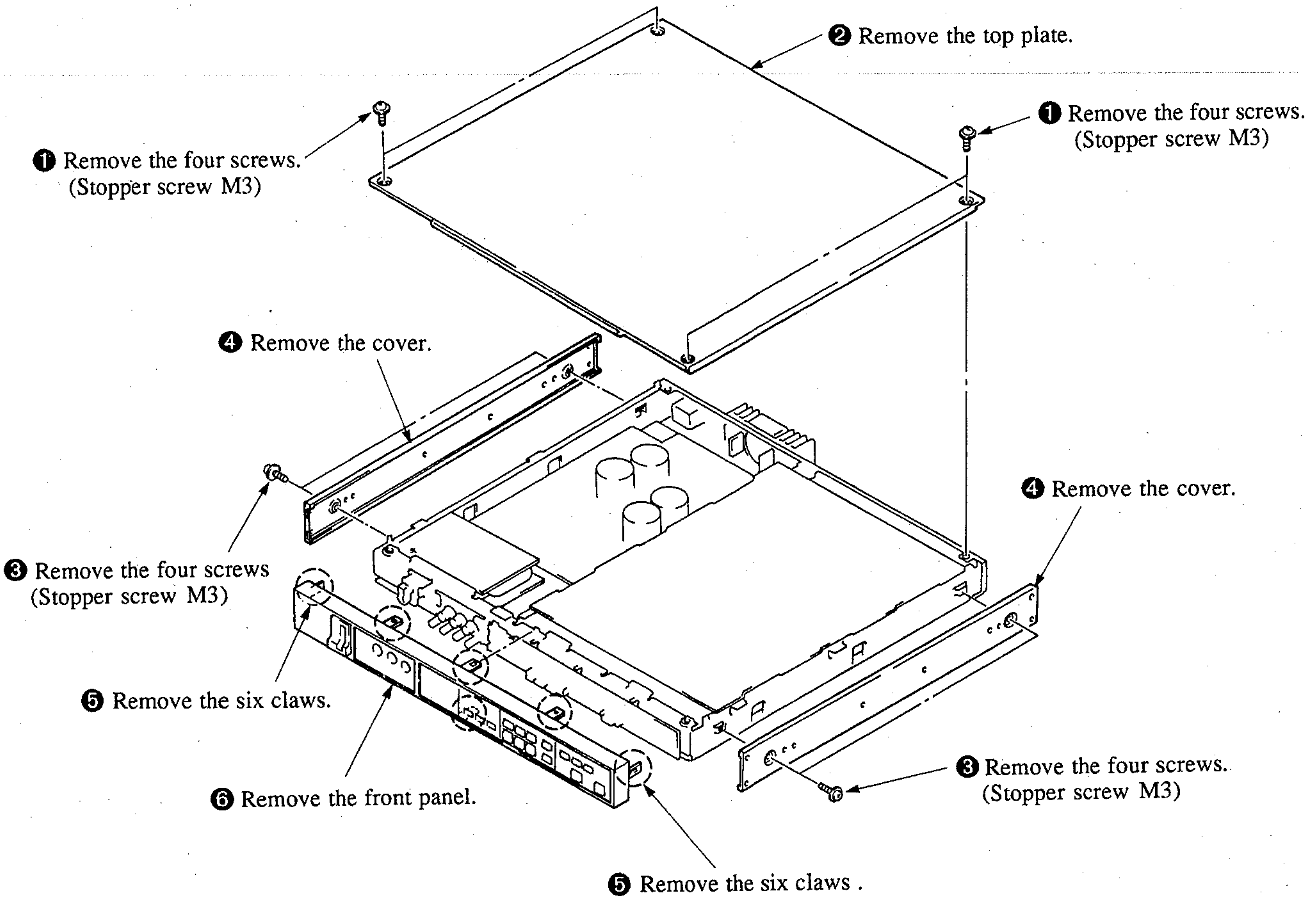
b7	GRAB CONTROL MODE	GRAB ON		MEMORY IN state
b6		MODE	FRAME	'1' when the grab mode is FRAME
b5			FIELD EVEN	'1' when the grab mode is FIELD EVEN
b4			FIELD ODD	'1' when the grab mode is FIELD ODD
b3	———			Reserved
b2	MUTE ON			'1' when image muting is turned on with the MUTE ON (E3h) command.
b1	———			Reserved
b0	LAP DISSOLVE ON			1: LAP DISSOLVE ON 0: LAP DISSOLVE OFF

STATUS 4

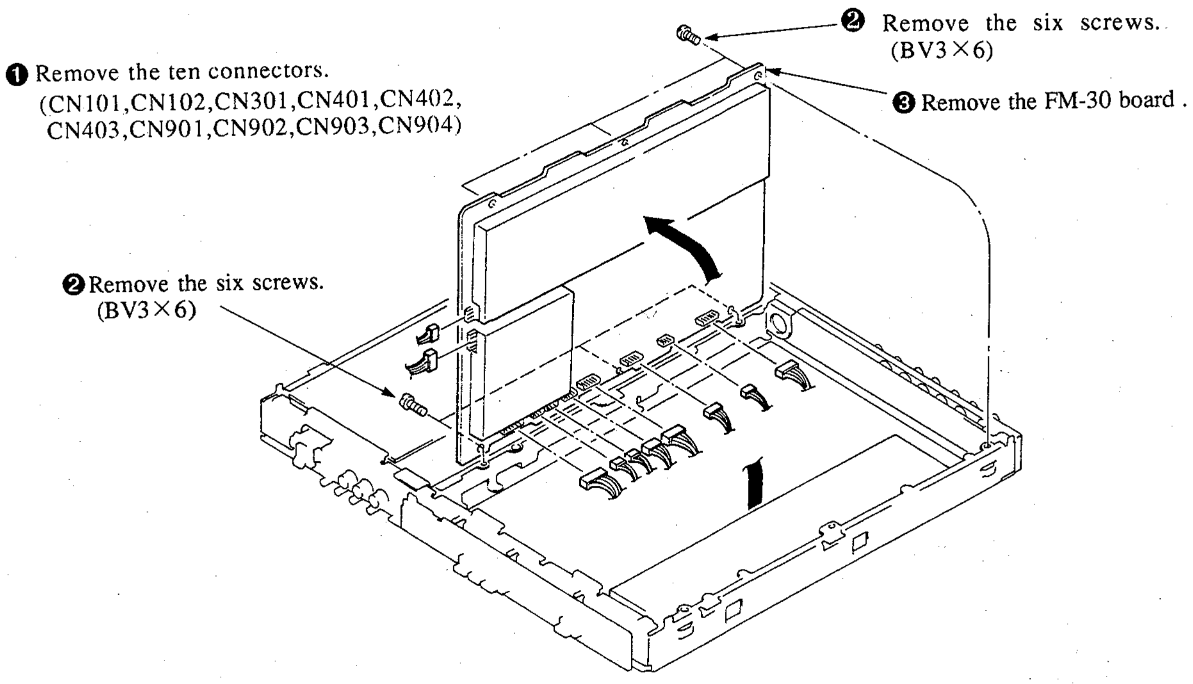
b7	PICTURE EFFECT MODE	0 OFF 1 Mosaic 2 Posterization 3 Multi-display
b6		
b5		
b4		
b3	PICTURE EFFECT LEVEL	When b7–b4 = 0 (OFF), b3–b0 are 0. When b7–b4 = 1 (mosaic), b3–b0 indicate the mosaic effect level (0 to 4). When b7–b4 = 2 (posterization), b3–b0 indicate the posterization effect level (0 to 3). When b7–b4 = 3 (multi-display), b3–b0 indicate the current multi-display position (0 to 8).
b2		
b1		
b0		

SECTION 2
DISASSEMBLY

2-1. FRONT PANEL REMOVAL

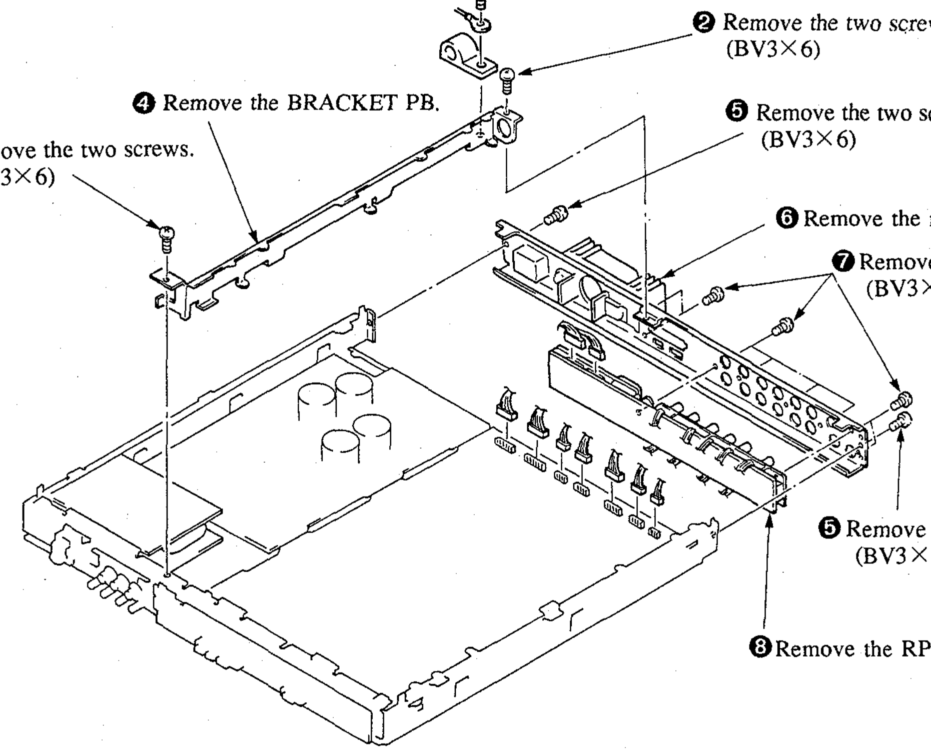

❷ Remove the top plate.
❶ Remove the four screws. (Stopper screw M3)
❶ Remove the four screws. (Stopper screw M3)
❹ Remove the cover.
❹ Remove the cover.
❸ Remove the four screws (Stopper screw M3)
❺ Remove the six claws.
❻ Remove the front panel.
❸ Remove the four screws. (Stopper screw M3)
❺ Remove the six claws .

2-2. FM-30 BOARD REMOVAL


❶ Remove the ten connectors. (CN101,CN102,CN301,CN401,CN402, CN403,CN901,CN902,CN903,CN904)
❷ Remove the six screws. (BV3×6)
❸ Remove the FM-30 board .
❷Remove the six screws. (BV3×6)

2-3. RP-67 BOARD REMOVAL

❶ Remove the nine connectors .
(CN003,CN005,CN101,CN102,CN103,
CN104,CN105,CN106,CN107)



❷ Remove the two screws.
(BV3×6)

❸ Remove the screw.
(BV3× 10)

❷ Remove the two screws.
(BV3×6)

❹ Remove the BRACKET PB.

❺ Remove the two screws.
(BV3×6)

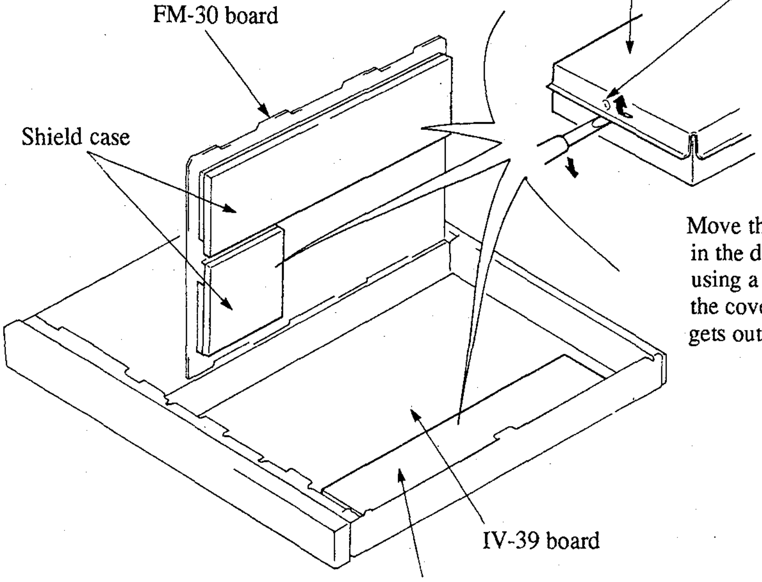
❻ Remove the rear panel.

❼ Remove the eight screws.
(BV3×6)

❺ Remove the two screws.
(BV3×6)

❽ Remove the RP-67 board.

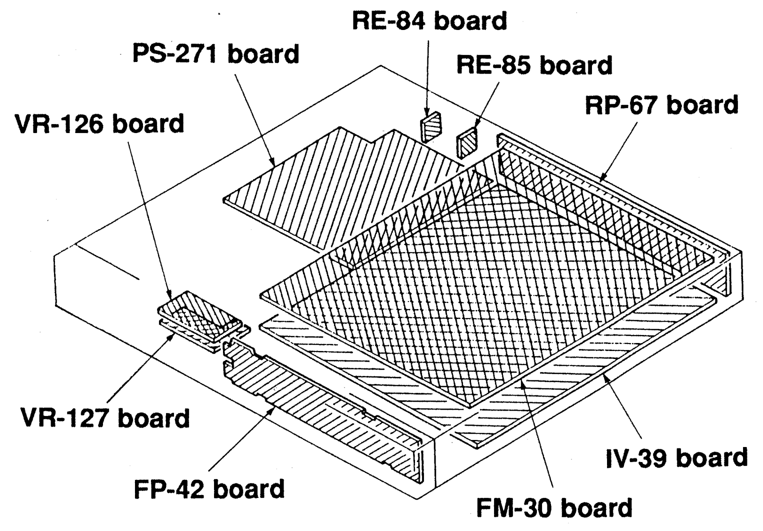
2-4. SHIELD CASE COVER REMOVAL



Move the edge of the shield case cover in the direction indicated by the arrow using a standard screwdriver and remove the cover after checking that the Boss gets out of place.

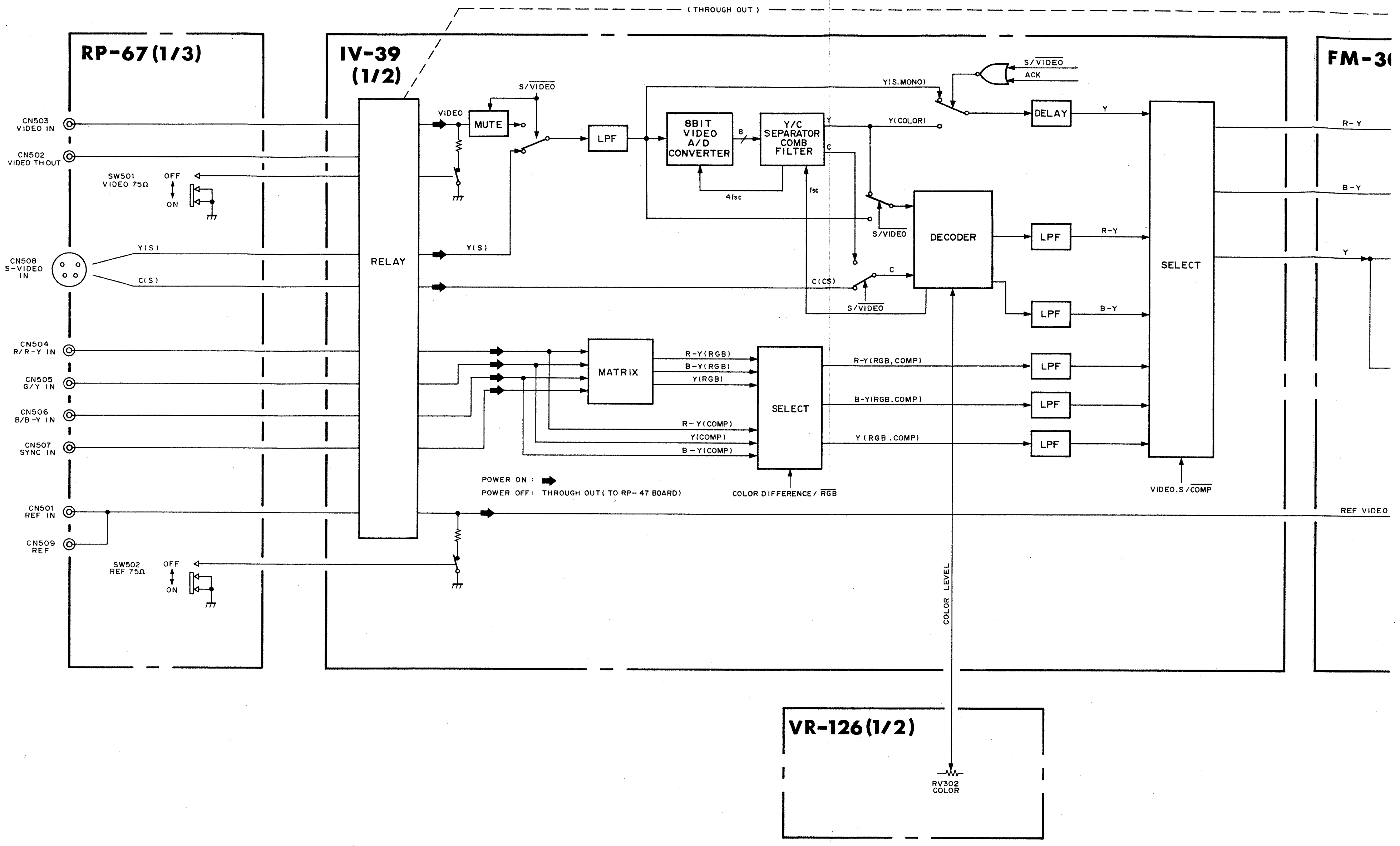
SECTION 3
DIAGRAMS

3-1. CIRCUIT BOARDS LOCATION

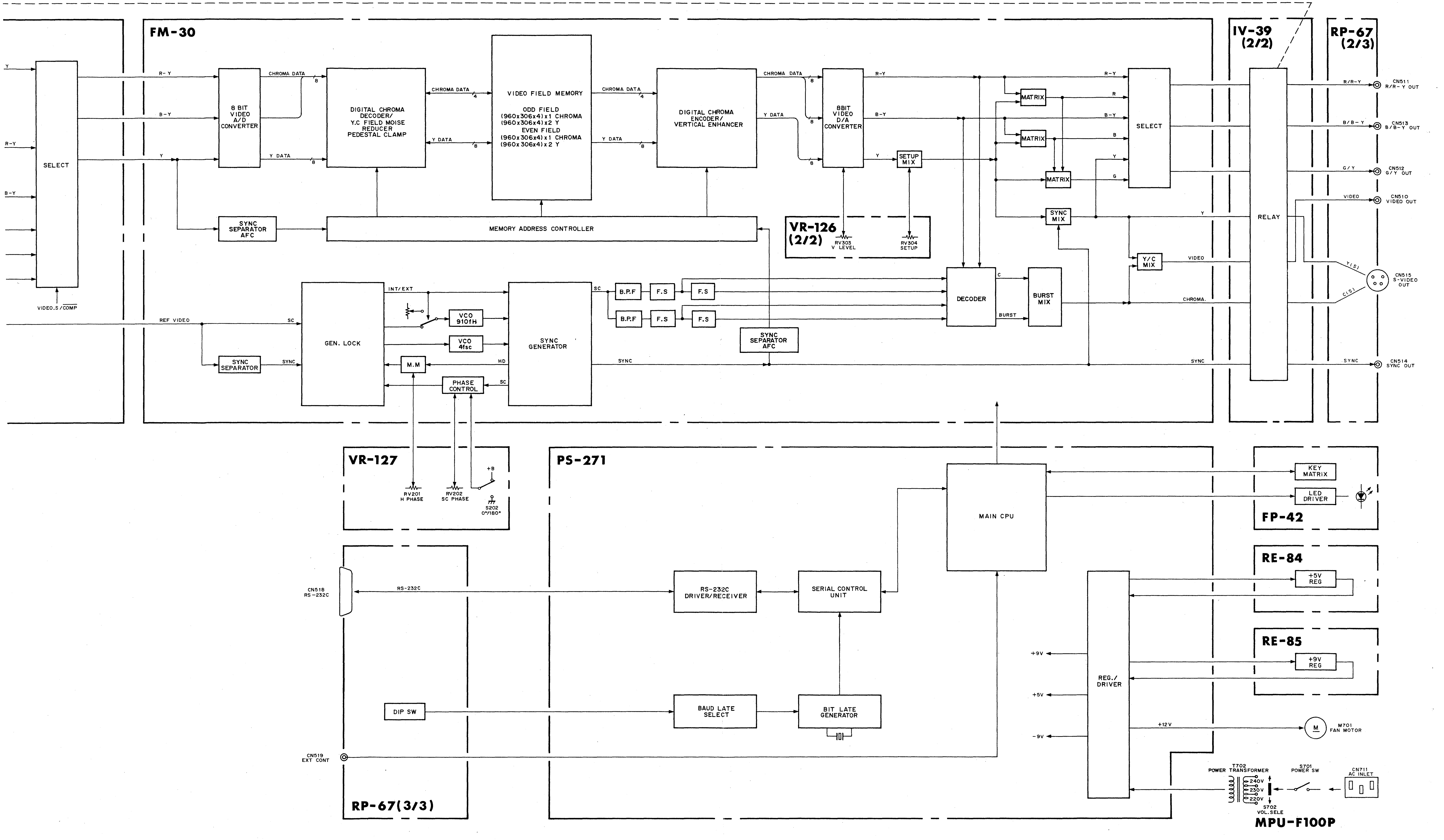


RE-84 board
PS-271 board
RE-85 board
RP-67 board
VR-126 board
VR-127 board
IV-39 board
FP-42 board
FM-30 board

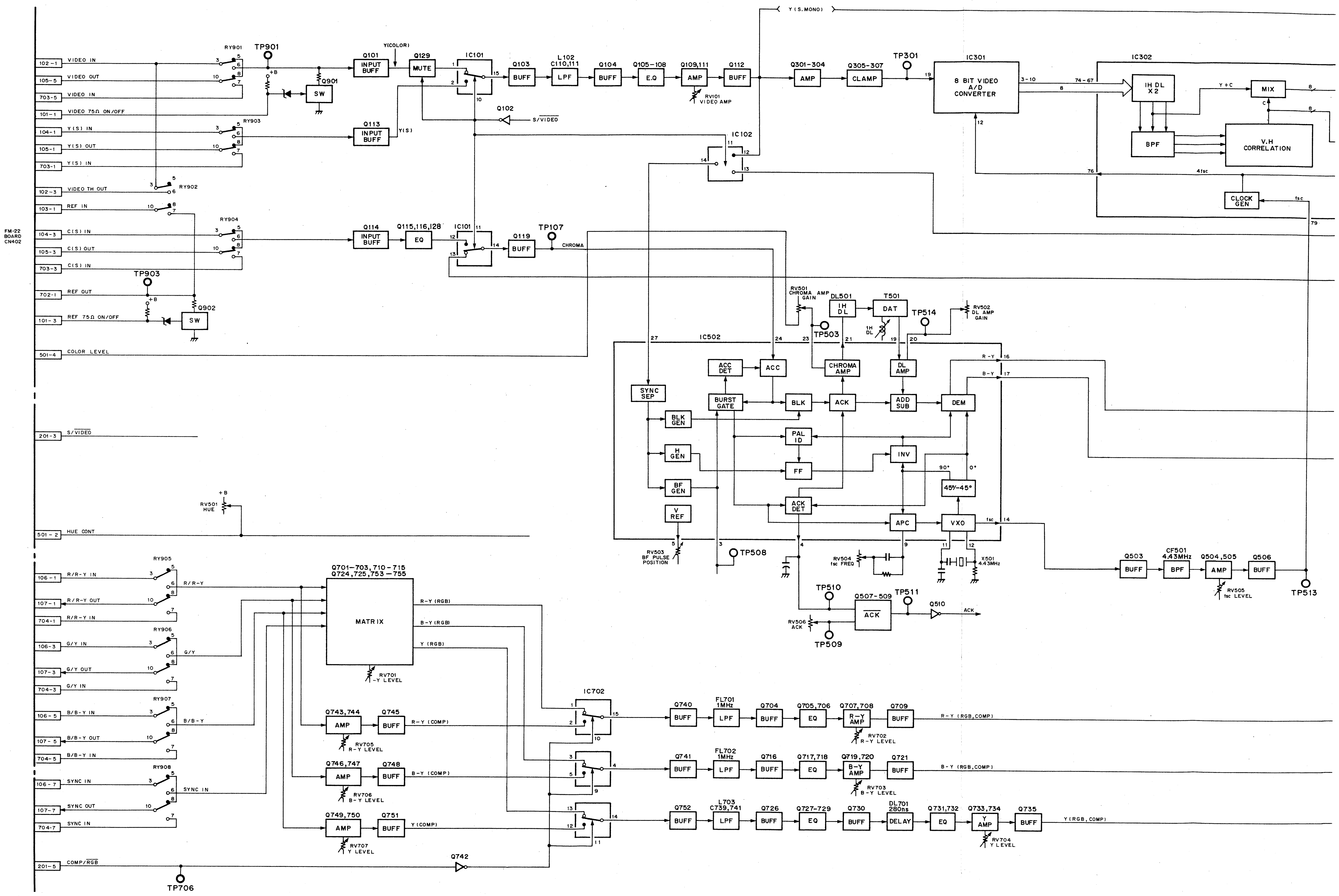
3-2. OVERALL BLOCK DIAGRAM

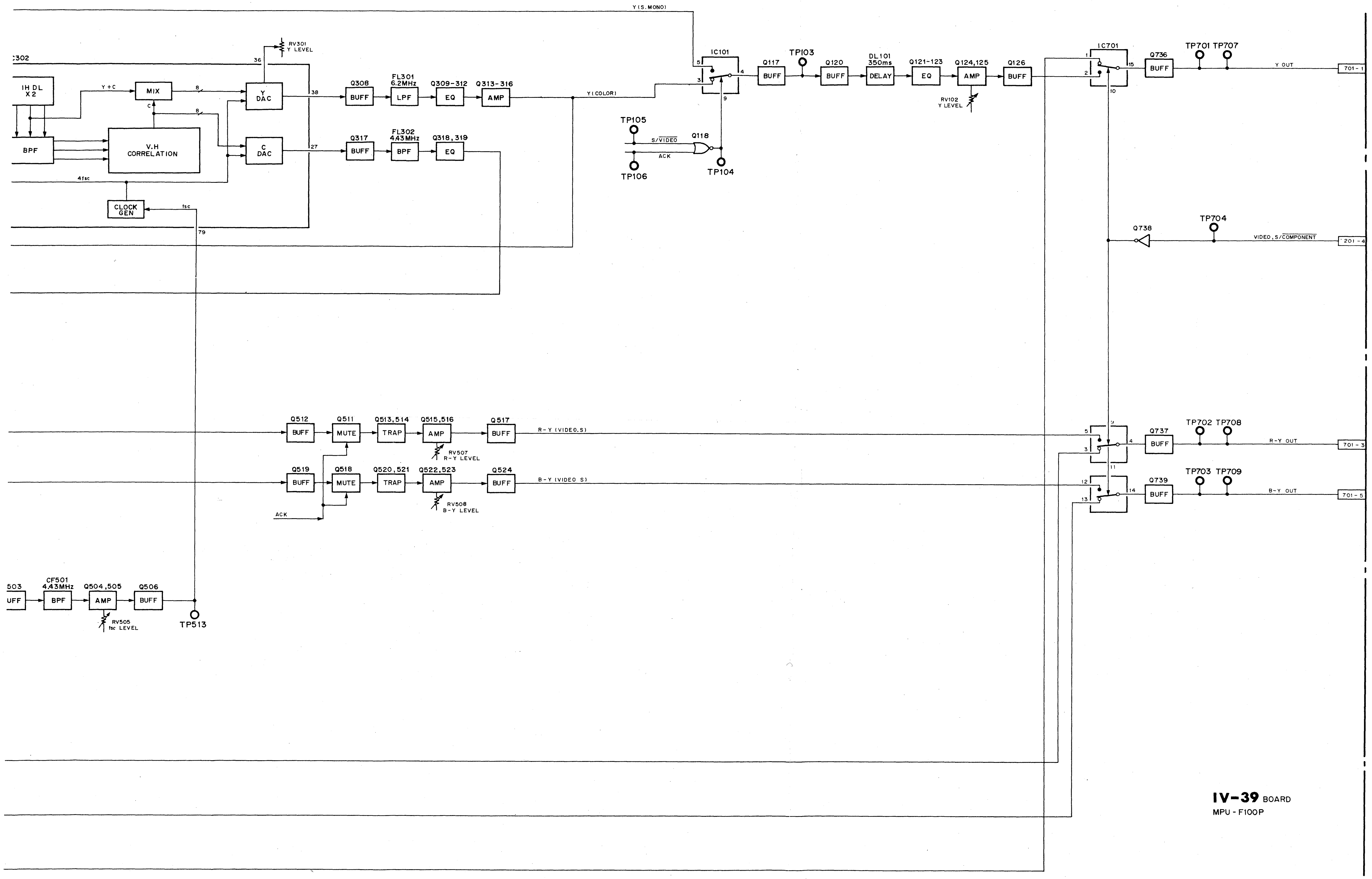


(THROUGH OUT)
RP-67(1/3)
IV-39 (1/2)
FM-3
CN503 VIDEO IN
CN502 VIDEO TH OUT
SW501 VIDEO 75Ω
OFF
ON
CN508 S-VIDEO IN
Y(S)
C(S)
CN504 R/R-Y IN
CN505 G/Y IN
CN506 B/B-Y IN
CN507 SYNC IN
CN501 REF IN
CN509 REF
SW502 REF 75Ω
OFF
ON
RELAY
VIDEO
MUTE
S/VIDEO
LPF
8BIT VIDEO A/D CONVERTER
8
Y/C SEPARATOR COMB FILTER
4fsc
fsc
Y
C
Y(S.MONO)
Y(COLOR)
S/VIDEO
ACK
DELAY
S/VIDEO
C(CS)
S/VIDEO
DECODER
LPF
R-Y
LPF
B-Y
SELECT
R-Y
B-Y
Y
MATRIX
R-Y(RGB)
B-Y(RGB)
Y(RGB)
R-Y(COMP)
Y(COMP)
B-Y(COMP)
SELECT
R-Y(RGB, COMP)
B-Y(RGB.COMP)
Y (RGB .COMP)
LPF
LPF
LPF
POWER ON :
POWER OFF: THROUGH OUT(TO RP-47 BOARD)
COLOR DIFFERENCE/ RGB
VIDEO.S/COMP
REF VIDEO
COLOR LEVEL
VR-126(1/2)
RV302 COLOR

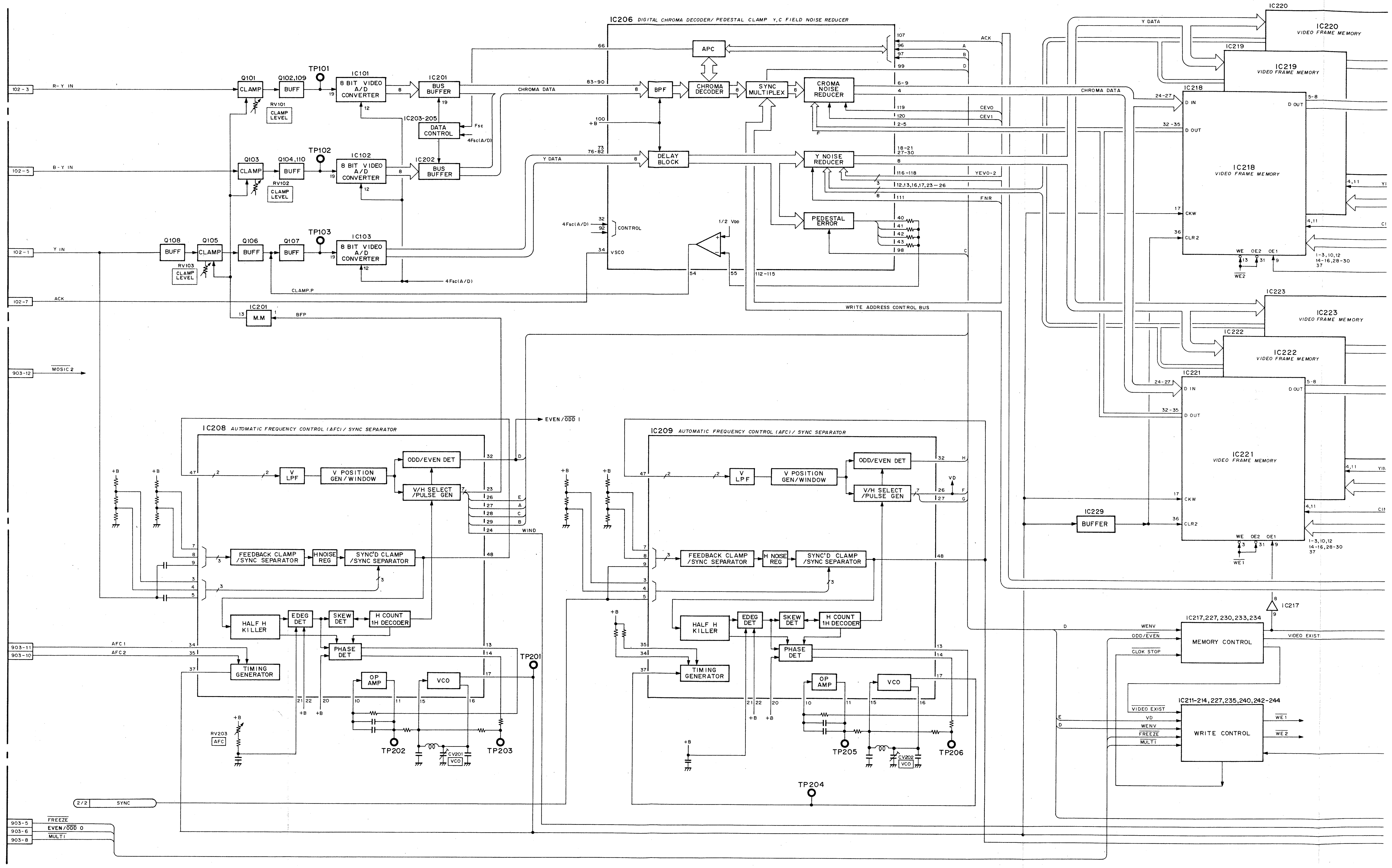

FM-30
SELECT
VIDEO.S/COMP
R-Y
B-Y
Y
8 BIT VIDEO A/D CONVERTER
CHROMA DATA
Y DATA
DIGITAL CHROMA DECODER/ Y.C FIELD MOISE REDUCER PEDESTAL CLAMP
VIDEO FIELD MEMORY
ODD FIELD (960x306x4)x1 CHROMA (960x306x4)x2 Y
EVEN FIELD (960x306x4)x1 CHROMA (960x306x4)x2 Y
DIGITAL CHROMA ENCODER/ VERTICAL ENHANCER
8BIT VIDEO D/A CONVERTER
SETUP MIX
MATRIX
R
B
G
SELECT
SYNC MIX
SYNC SEPARATOR AFC
MEMORY ADDRESS CONTROLLER
VR-126 (2/2)
RV303 V LEVEL
RV304 SETUP
REF VIDEO
SYNC SEPARATOR
SYNC
SC
GEN. LOCK
INT/EXT
VCO 910fH
VCO 4fsc
M.M
HD
PHASE CONTROL
SYNC GENERATOR
B.P.F
F.S
DECODER
C
BURST
BURST MIX
Y/C MIX
VIDEO
CHROMA.
IV-39 (2/2)
RELAY
RP-67 (2/3)
R/R-Y
CN511 R/R-Y OUT
B/B-Y
CN513 B/B-Y OUT
G/Y
CN512 G/Y OUT
CN510 VIDEO OUT
Y(S)
C(S)
CN515 S-VIDEO OUT
CN514 SYNC OUT
VR-127
+B
RV201 H PHASE
RV202 SC PHASE
S202 0°/180°
PS-271
MAIN CPU
RS-232C DRIVER/RECEIVER
SERIAL CONTROL UNIT
BAUD LATE SELECT
BIT LATE GENERATOR
CN518 RS-232C
RS-232C
DIP SW
CN519 EXT CONT
RP-67(3/3)
FP-42
KEY MATRIX
LED DRIVER
RE-84
+5V REG
RE-85
+9V REG
REG./ DRIVER
+9V
+5V
-9V
+12V
M
M701 FAN MOTOR
T702 POWER TRANSFORMER
240V
230V
220V
S702 VOL.SELE
S701 POWER SW
CN711 AC INLET
MPU-F100P

3-3. INPUT VIDEO BLOCK DIAGRAM

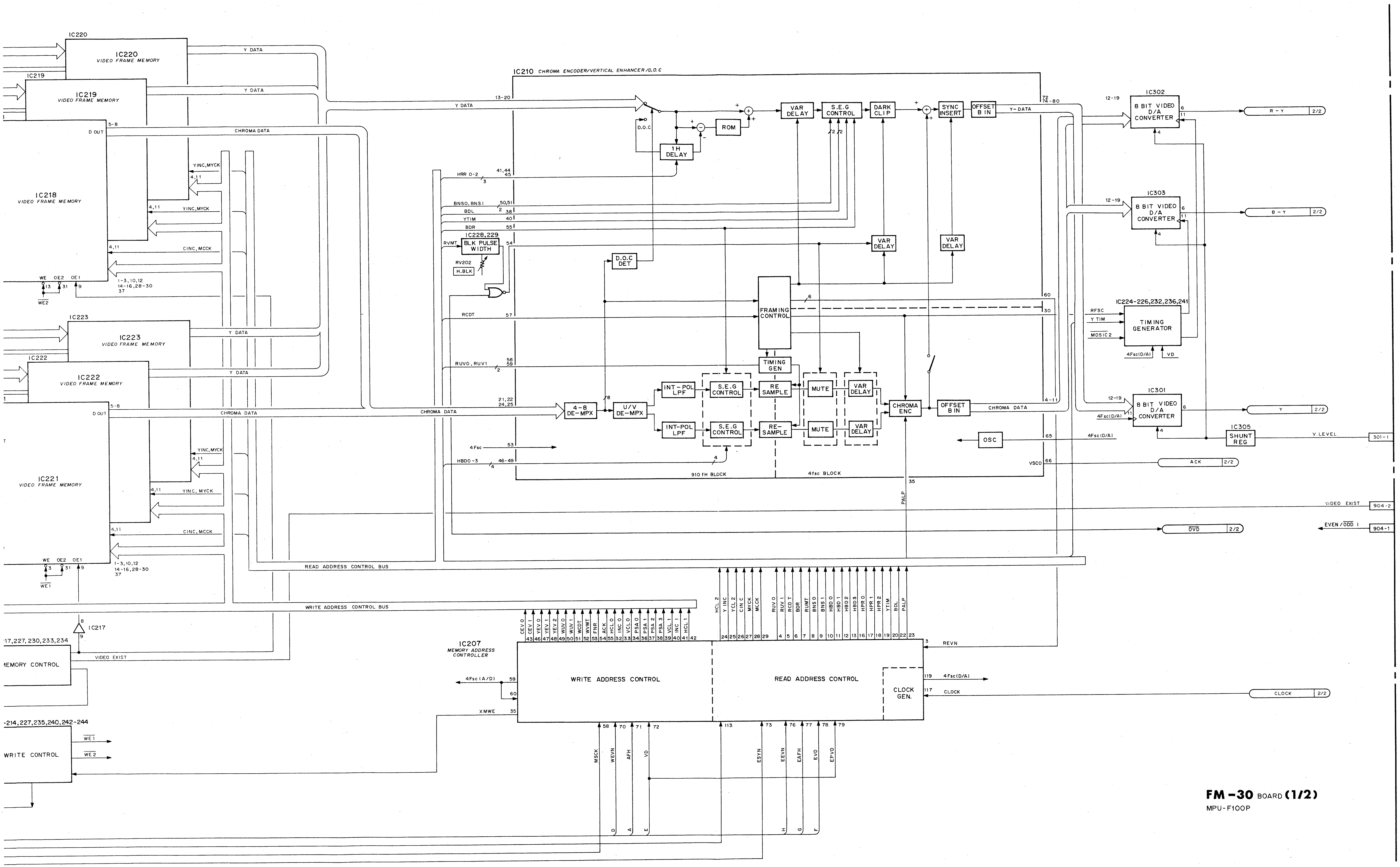

FM-22 BOARD CN402
102-1 VIDEO IN
105-5 VIDEO OUT
703-5 VIDEO IN
101-1 VIDEO 75Ω ON/OFF
104-1 Y(S) IN
105-1 Y(S) OUT
703-1 Y(S) IN
102-3 VIDEO TH OUT
103-1 REF IN
104-3 C(S) IN
105-3 C(S) OUT
703-3 C(S) IN
702-1 REF OUT
101-3 REF 75Ω ON/OFF
501-4 COLOR LEVEL
201-3 S/VIDEO
501-2 HUE CONT
106-1 R/R-Y IN
107-1 R/R-Y OUT
704-1 R/R-Y IN
106-3 G/Y IN
107-3 G/Y OUT
704-3 G/Y IN
106-5 B/B-Y IN
107-5 B/B-Y OUT
704-5 B/B-Y IN
106-7 SYNC IN
107-7 SYNC OUT
704-7 SYNC IN
201-5 COMP/RGB
RY901
RY902
RY903
RY904
RY905
RY906
RY907
RY908
TP901
TP903
TP706
TP107
TP301
TP503
TP508
TP509
TP510
TP511
TP513
TP514
Q901 SW
Q902 SW
+B
Y(COLOR)
Q101 INPUT BUFF
Q129 MUTE
IC101
Q103 BUFF
L102 C110,111 LPF
Q104 BUFF
Q105-108 E.Q
Q109,111 AMP
RV101 VIDEO AMP
Q112 BUFF
Q102
S/VIDEO
Q113 INPUT BUFF
Y(S)
IC102
Y(S.MONO)
Q301-304 AMP
Q305-307 CLAMP
IC301 8 BIT VIDEO A/D CONVERTER
3-10
74-67
8
IC302
1H DL X2
BPF
Y+C
MIX
C
V.H CORRELATION
4fsc
76
CLOCK GEN
fsc
79
Q114 INPUT BUFF
Q115,116,128 EQ
Q119 BUFF
CHROMA
RV501 CHROMA AMP GAIN
DL501 1H DL
T501 DAT
1H DL
RV502 DL AMP GAIN
IC502
ACC DET
ACC
CHROMA AMP
DL AMP
SYNC SEP
BURST GATE
BLK
ACK
ADD SUB
DEM
R-Y
B-Y
BLK GEN
PAL ID
INV
H GEN
FF
90°
0°
45°/-45°
BF GEN
ACK DET
V REF
APC
VXO
fsc
RV503 BF PULSE POSITION
RV504 fsc FREQ
X501 4.43MHz
Q503 BUFF
CF501 4.43MHz BPF
Q504,505 AMP
RV505 fsc LEVEL
Q506 BUFF
Q507-509 ACK
RV506 ACK
Q510
ACK
RV501 HUE
Q701-703,710-715 Q724,725,753-755
MATRIX
R/R-Y
G/Y
B/B-Y
SYNC IN
R-Y (RGB)
B-Y (RGB)
Y (RGB)
RV701 -Y LEVEL
Q743,744 AMP
RV705 R-Y LEVEL
Q745 BUFF
R-Y (COMP)
Q746,747 AMP
RV706 B-Y LEVEL
Q748 BUFF
B-Y (COMP)
Q749,750 AMP
RV707 Y LEVEL
Q751 BUFF
Y (COMP)
Q742
IC702
Q740 BUFF
FL701 1MHz LPF
Q704 BUFF
Q705,706 EQ
Q707,708 R-Y AMP
RV702 R-Y LEVEL
Q709 BUFF
R-Y (RGB, COMP)
Q741 BUFF
FL702 1MHz LPF
Q716 BUFF
Q717,718 EQ
Q719,720 B-Y AMP
RV703 B-Y LEVEL
Q721 BUFF
B-Y (RGB, COMP)
Q752 BUFF
L703 C739,741 LPF
Q726 BUFF
Q727-729 EQ
Q730 BUFF
DL701 280ns DELAY
Q731,732 EQ
Q733,734 Y AMP
RV704 Y LEVEL
Q735 BUFF
Y (RGB, COMP)


Y(S.MONO)
:302
36
RV301
Y LEVEL
IH DL
X2
Y+C
MIX
8
C
8
Y
DAC
38
C
DAC
27
BPF
V.H
CORRELATION
4fsc
CLOCK
GEN
fsc
79
Q308
BUFF
FL301
6.2MHz
LPF
Q309-312
EQ
Q313-316
AMP
Q317
BUFF
FL302
4.43MHz
BPF
Q318,319
EQ
Y(COLOR)
IC101
5
3
4
9
TP105
S/VIDEO
ACK
Q118
TP106
TP104
Q117
BUFF
TP103
Q120
BUFF
DL101
350ms
DELAY
Q121-123
EQ
Q124,125
AMP
RV102
Y LEVEL
Q126
BUFF
IC701
1
2
15
10
Q736
BUFF
TP701 TP707
Y OUT
701-1
Q738
TP704
VIDEO,S/COMPONENT
201-4
Q512
BUFF
Q511
MUTE
Q513,514
TRAP
Q515,516
AMP
RV507
R-Y LEVEL
Q517
BUFF
R-Y (VIDEO.S)
Q519
BUFF
Q518
MUTE
Q520,521
TRAP
Q522,523
AMP
RV508
B-Y LEVEL
Q524
BUFF
B-Y (VIDEO S)
ACK
9
5
3
4
11
12
13
14
Q737
BUFF
TP702 TP708
R-Y OUT
701-3
Q739
BUFF
TP703 TP709
B-Y OUT
701-5
503
UFF
CF501
4.43MHz
BPF
Q504,505
AMP
RV505
fsc LEVEL
Q506
BUFF
TP513
IV-39 BOARD
MPU-F100P

3-4. FRAME MEMORY BLOCK DIAGRAM (1)

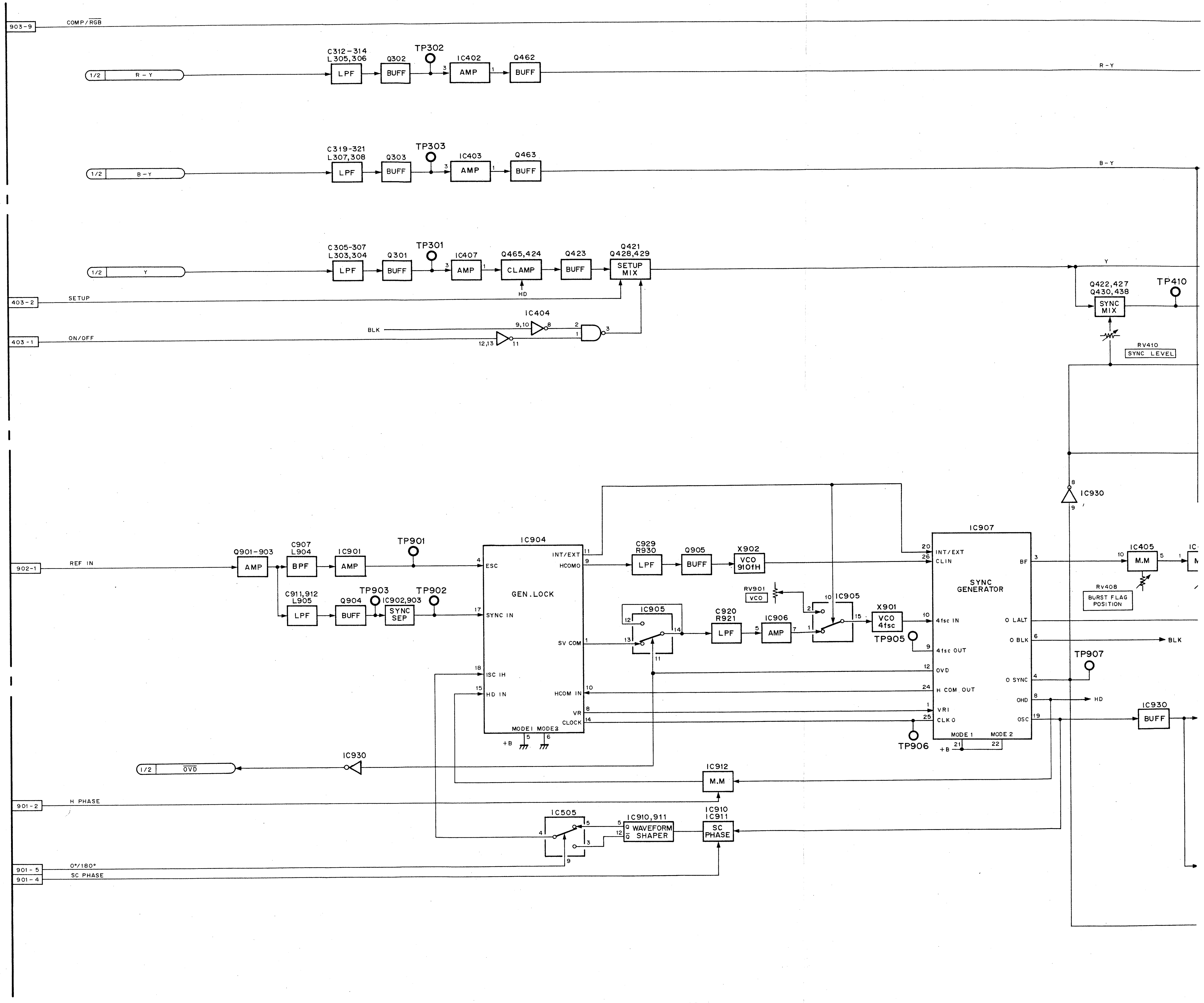


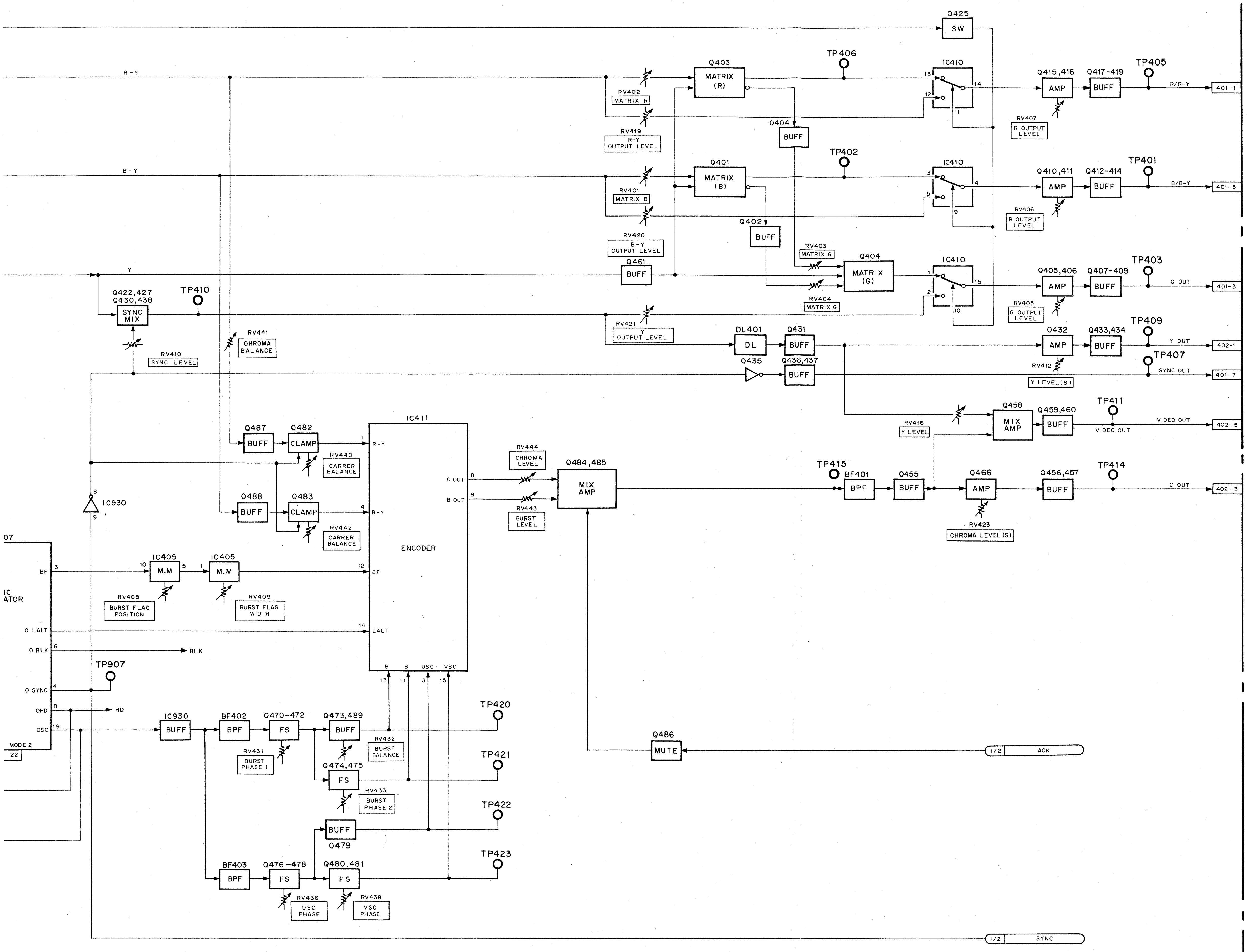
102-3
R-Y IN
102-5
B-Y IN
102-1
Y IN
102-7
ACK
903-12
MOSIC 2
903-11
903-10
AFC 1
AFC 2
903-5
903-6
903-8
FREEZE
EVEN/ODD 0
MULTI
2/2
SYNC
Q101
CLAMP
Q102,109
BUFF
RV101
CLAMP LEVEL
Q103
CLAMP
Q104,110
BUFF
RV102
CLAMP LEVEL
Q108
BUFF
Q105
CLAMP
RV103
CLAMP LEVEL
Q106
BUFF
Q107
BUFF
TP101
TP102
TP103
IC101
8 BIT VIDEO A/D CONVERTER
IC102
8 BIT VIDEO A/D CONVERTER
IC103
8 BIT VIDEO A/D CONVERTER
IC201
BUS BUFFER
IC202
BUS BUFFER
IC203-205
DATA CONTROL
Fsc
4Fsc(A/D)
CLAMP.P
IC201
M.M
BFP
IC206 DIGITAL CHROMA DECODER/ PEDESTAL CLAMP Y,C FIELD NOISE REDUCER
CHROMA DATA
Y DATA
APC
BPF
CHROMA DECODER
SYNC MULTIPLEX
CROMA NOISE REDUCER
DELAY BLOCK
Y NOISE REDUCER
PEDESTAL ERROR
CONTROL
VSCO
1/2 VDD
CEV0
CEV1
YEV0-2
FNR
WRITE ADDRESS CONTROL BUS
EVEN/ODD I
IC208 AUTOMATIC FREQUENCY CONTROL (AFC)/ SYNC SEPARATOR
V LPF
V POSITION GEN/WINDOW
ODD/EVEN DET
V/H SELECT /PULSE GEN
WIND
FEEDBACK CLAMP /SYNC SEPARATOR
H NOISE REG
SYNC'D CLAMP /SYNC SEPARATOR
HALF H KILLER
EDEG DET
SKEW DET
H COUNT 1H DECODER
PHASE DET
TIMING GENERATOR
OP AMP
VCO
RV203
AFC
TP201
TP202
TP203
CV201
VCO
IC209 AUTOMATIC FREQUENCY CONTROL (AFC)/ SYNC SEPARATOR
V LPF
V POSITION GEN/WINDOW
ODD/EVEN DET
V/H SELECT /PULSE GEN
VD
FEEDBACK CLAMP /SYNC SEPARATOR
H NOISE REG
SYNC'D CLAMP /SYNC SEPARATOR
HALF H KILLER
EDEG DET
SKEW DET
H COUNT 1H DECODER
PHASE DET
TIMING GENERATOR
OP AMP
VCO
TP204
TP205
TP206
CV202
VCO
IC220
VIDEO FRAME MEMORY
IC219
VIDEO FRAME MEMORY
IC218
VIDEO FRAME MEMORY
D IN
D OUT
CKW
CLR2
WE OE2 OE1
WE2
IC223
VIDEO FRAME MEMORY
IC222
VIDEO FRAME MEMORY
IC221
VIDEO FRAME MEMORY
WE1
IC229
BUFFER
IC217
IC217,227,230,233,234
MEMORY CONTROL
WENV
ODD/EVEN
CLOK STOP
VIDEO EXIST
IC211-214,227,235,240,242-244
WRITE CONTROL
VIDEO EXIST
VD
WENV
FREEZE
MULTI
WE1
WE2


IC220
IC220 VIDEO FRAME MEMORY
IC219
IC219 VIDEO FRAME MEMORY
IC218 VIDEO FRAME MEMORY
IC223
IC223 VIDEO FRAME MEMORY
IC222
IC222 VIDEO FRAME MEMORY
IC221 VIDEO FRAME MEMORY
Y DATA
CHROMA DATA
D OUT
5-8
YINC, MYCK
CINC, MCCK
4,11
WE OE2 OE1
WE2
WE1
1-3,10,12 14-16,28-30 37
IC210 CHROMA ENCODER/VERTICAL ENHANCER/D.O.C
13-20
D.O.C
1H DELAY
ROM
VAR DELAY
S.E.G CONTROL
DARK CLIP
SYNC INSERT
OFFSET B IN
Y-DATA
72 74-80
HRR 0-2
41,44 45
BNSO, BNS1
BDL
YTIM
BDR
50,51
38
40
55
IC228,229
RVMT
BLK PULSE WIDTH
54
RV202
H.BLK
D.O.C DET
RCDT
57
FRAMING CONTROL
TIMING GEN
RUVO, RUV1
58 59
INT-POL LPF
S.E.G CONTROL
RE SAMPLE
MUTE
VAR DELAY
CHROMA ENC
OFFSET B IN
CHROMA DATA
21,22 24,25
4-8 DE-MPX
U/V DE-MPX
4Fsc
53
HBDO-3
46-49
910 fH BLOCK
4fsc BLOCK
OSC
PALP
35
60
30
4-11
65
66
VSCO
IC302
8 BIT VIDEO D/A CONVERTER
12-19
R-Y 2/2
IC303
8 BIT VIDEO D/A CONVERTER
B-Y 2/2
IC224-226,232,236,241
RFSC
Y TIM
MOSIC 2
TIMING GENERATOR
4Fsc(D/A)
VD
IC301
8 BIT VIDEO D/A CONVERTER
Y 2/2
IC305
SHUNT REG
V LEVEL
301-1
ACK 2/2
VIDEO EXIST
904-2
OVD 2/2
EVEN/ODD 1
904-1
READ ADDRESS CONTROL BUS
WRITE ADDRESS CONTROL BUS
IC217
17,227,230,233,234
MEMORY CONTROL
VIDEO EXIST
-214,227,235,240,242-244
WRITE CONTROL
WE1
WE2
CEV 0 CEV 1 YEV 0 YEV 1 YEV 2 WUV 0 WUV 1 WCDT WVMT FNR ACK HCL 0 INC 0 VCL 0 PSA 0 PSA 1 PSA 2 PSA 3 VCL 1 INC 1 HCL 1
43 46 47 48 49 50 51 52 53 54 55 32 33 34 36 37 38 39 40 41 42
HCL 2 Y INC YCL 2 CINC MYCK MCCK RUV 0 RUV 1 RCDT BDR RUMT BNS 0 BNS 1 HBD 0 HBD 1 HBD 2 HBD 3 HPR 0 HPR 1 HPR 2 YTIM BDL PALP
24 25 26 27 28 29 4 5 6 7 8 9 10 11 12 13 16 17 18 19 20 22 23
IC207 MEMORY ADDRESS CONTROLLER
WRITE ADDRESS CONTROL
READ ADDRESS CONTROL
CLOCK GEN.
4Fsc(A/D)
59
60
XMWE
35
3 REVN
119 4Fsc(D/A)
117 CLOCK
CLOCK 2/2
58 70 71 72
MSCK WEVN AFH VD
113 73 76 77 78 79
ESYN EEVN EAFH EVD EPVD
D A E H G F

FM-30 BOARD **(1/2)**
MPU-F100P

3-5. FRAME MEMORY BLOCK DIAGRAM (2)

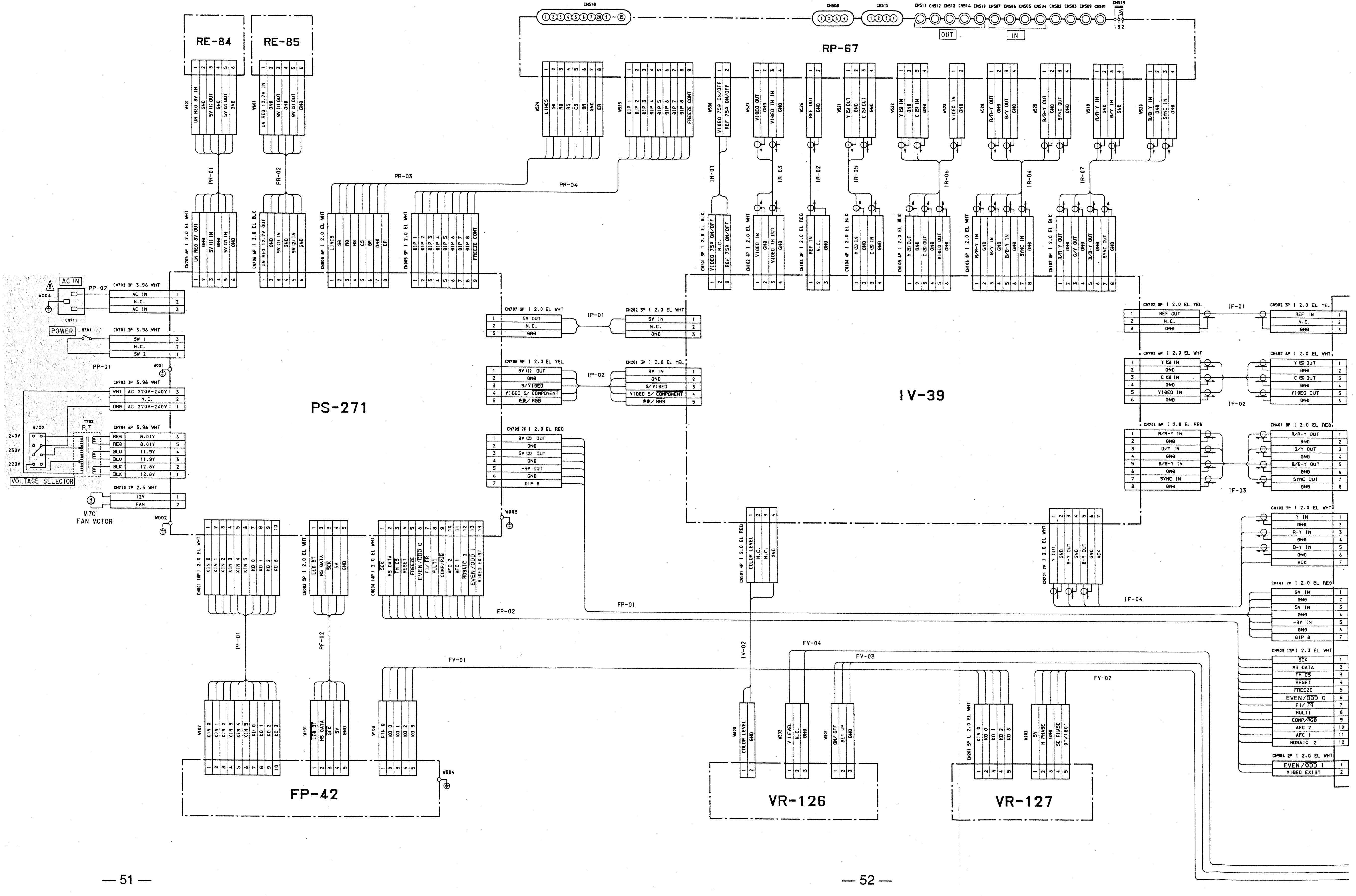

903-9
COMP/RGB
1/2 R-Y
C312-314
L305,306
LPF
Q302
BUFF
TP302
IC402
AMP
Q462
BUFF
R-Y
1/2 B-Y
C319-321
L307,308
LPF
Q303
BUFF
TP303
IC403
AMP
Q463
BUFF
B-Y
1/2 Y
C305-307
L303,304
LPF
Q301
BUFF
TP301
IC407
AMP
Q465,424
CLAMP
HD
Q423
BUFF
Q421
Q428,429
SETUP MIX
Y
Q422,427
Q430,438
SYNC MIX
TP410
RV410
SYNC LEVEL
403-2
SETUP
403-1
ON/OFF
BLK
IC404
9,10
8
12,13
11
IC930
902-1
REF IN
Q901-903
AMP
C907
L904
BPF
IC901
AMP
TP901
C911,912
L905
LPF
Q904
BUFF
TP903
IC902,903
SYNC SEP
TP902
IC904
GEN.LOCK
ESC
SYNC IN
ISC IH
HD IN
INT/EXT
HCOMO
SV COM
HCOM IN
VR
CLOCK
MODE1 MODE2
+B
C929
R930
LPF
Q905
BUFF
X902
VCO
9101H
RV901
VCO
IC905
C920
R921
LPF
IC906
AMP
IC905
X901
VCO
4fsc
TP905
IC907
SYNC GENERATOR
INT/EXT
CLIN
4fsc IN
4fsc OUT
OVD
H COM OUT
VRI
CLK O
MODE 1
MODE 2
BF
O LALT
O BLK
O SYNC
OHD
OSC
TP906
BLK
TP907
HD
IC405
M.M
RV408
BURST FLAG POSITION
IC930
BUFF
1/2 OVD
IC930
IC912
M.M
901-2
H PHASE
IC505
IC910,911
WAVEFORM SHAPER
IC910
IC911
SC PHASE
901-5
0°/180°
901-4
SC PHASE

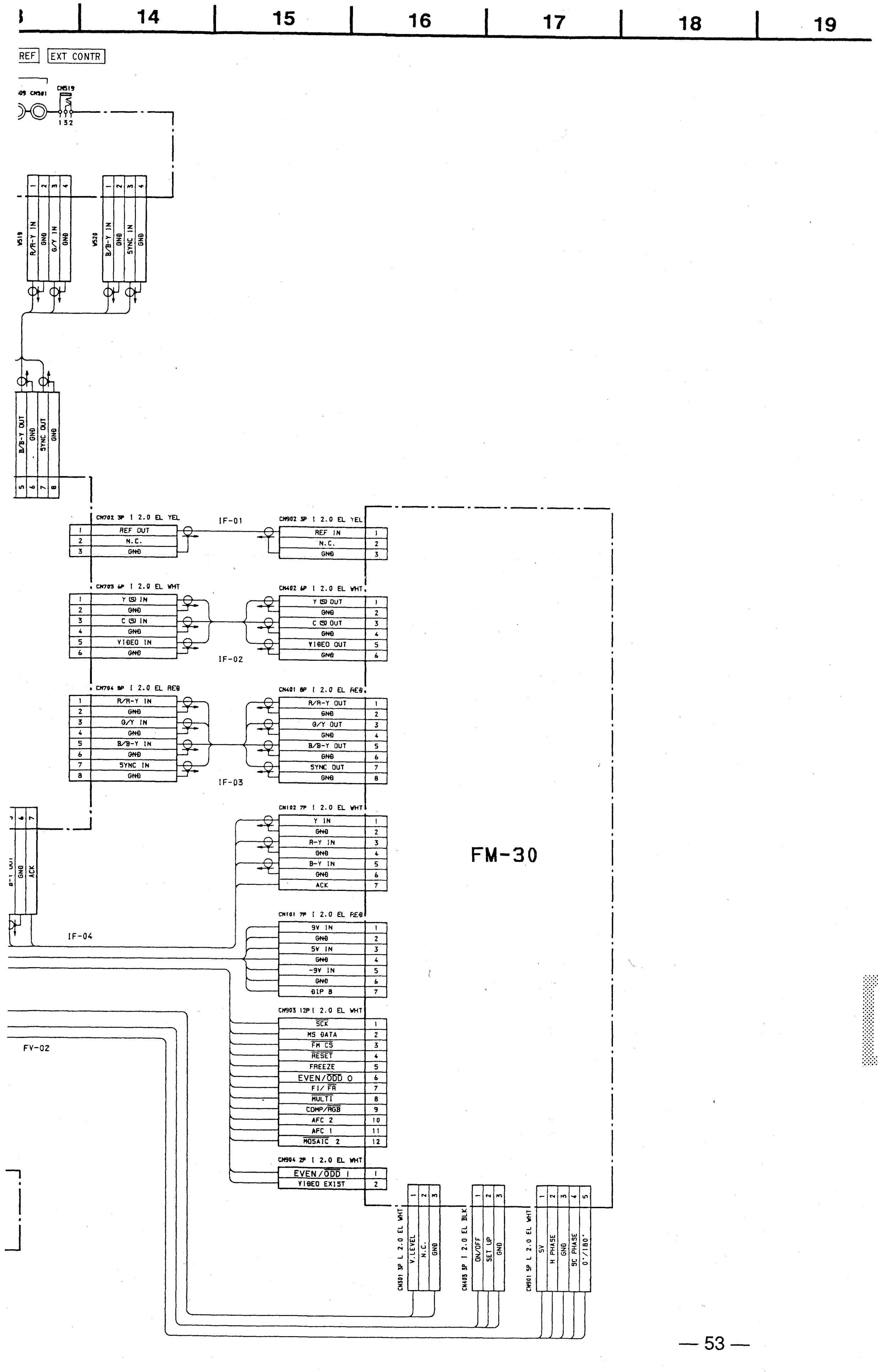

Q425
SW
R-Y
TP406
Q403
MATRIX (R)
RV402
MATRIX R
RV419
R-Y OUTPUT LEVEL
Q404
BUFF
IC410
13
12
11
14
Q415,416
AMP
Q417-419
BUFF
TP405
R/R-Y
401-1
RV407
R OUTPUT LEVEL
B-Y
TP402
Q401
MATRIX (B)
RV401
MATRIX B
IC410
3
5
9
4
Q410,411
AMP
Q412-414
BUFF
TP401
B/B-Y
401-5
RV406
B OUTPUT LEVEL
Q402
BUFF
RV420
B-Y OUTPUT LEVEL
RV403
MATRIX G
Q404
MATRIX (G)
RV404
MATRIX G
IC410
1
2
10
15
Q405,406
AMP
Q407-409
BUFF
TP403
G OUT
401-3
RV405
G OUTPUT LEVEL
Y
Q461
BUFF
Q422,427
Q430,438
SYNC MIX
TP410
RV410
SYNC LEVEL
RV441
CHROMA BALANCE
RV421
Y OUTPUT LEVEL
DL401
DL
Q431
BUFF
Q432
AMP
Q433,434
BUFF
TP409
Y OUT
402-1
RV412
Y LEVEL(S)
Q435
Q436,437
BUFF
TP407
SYNC OUT
401-7
RV416
Y LEVEL
Q458
MIX AMP
Q459,460
BUFF
TP411
VIDEO OUT
VIDEO OUT
402-5
IC411
Q487
BUFF
Q482
CLAMP
RV440
CARRIER BALANCE
Q488
BUFF
Q483
CLAMP
RV442
CARRIER BALANCE
R-Y
B-Y
BF
LALT
C OUT
B OUT
ENCODER
B
B
USC
VSC
13
11
3
15
RV444
CHROMA LEVEL
RV443
BURST LEVEL
Q484,485
MIX AMP
TP415
BF401
BPF
Q455
BUFF
Q466
AMP
RV423
CHROMA LEVEL(S)
Q456,457
BUFF
TP414
C OUT
402-3
IC930
07
IC
ATOR
BF
IC405
M.M
IC405
M.M
RV408
BURST FLAG POSITION
RV409
BURST FLAG WIDTH
O LALT
O BLK
BLK
TP907
O SYNC
OHD
HD
OSC
MODE 2
22
IC930
BUFF
BF402
BPF
Q470-472
FS
RV431
BURST PHASE 1
Q473,489
BUFF
RV432
BURST BALANCE
TP420
Q474,475
FS
RV433
BURST PHASE 2
TP421
BUFF
Q479
TP422
BF403
BPF
Q476-478
FS
RV436
USC PHASE
Q480,481
FS
RV438
VSC PHASE
TP423
Q486
MUTE
1/2
ACK
1/2
SYNC

FM-30 BOARD **(2/2)**
MPU-F100P

SECTION 4
PRINTED WIRING BOARDS AND SCHEMATIC DIAGRAMS

4-1. FRAME SCHEMATIC DIAGRAMS

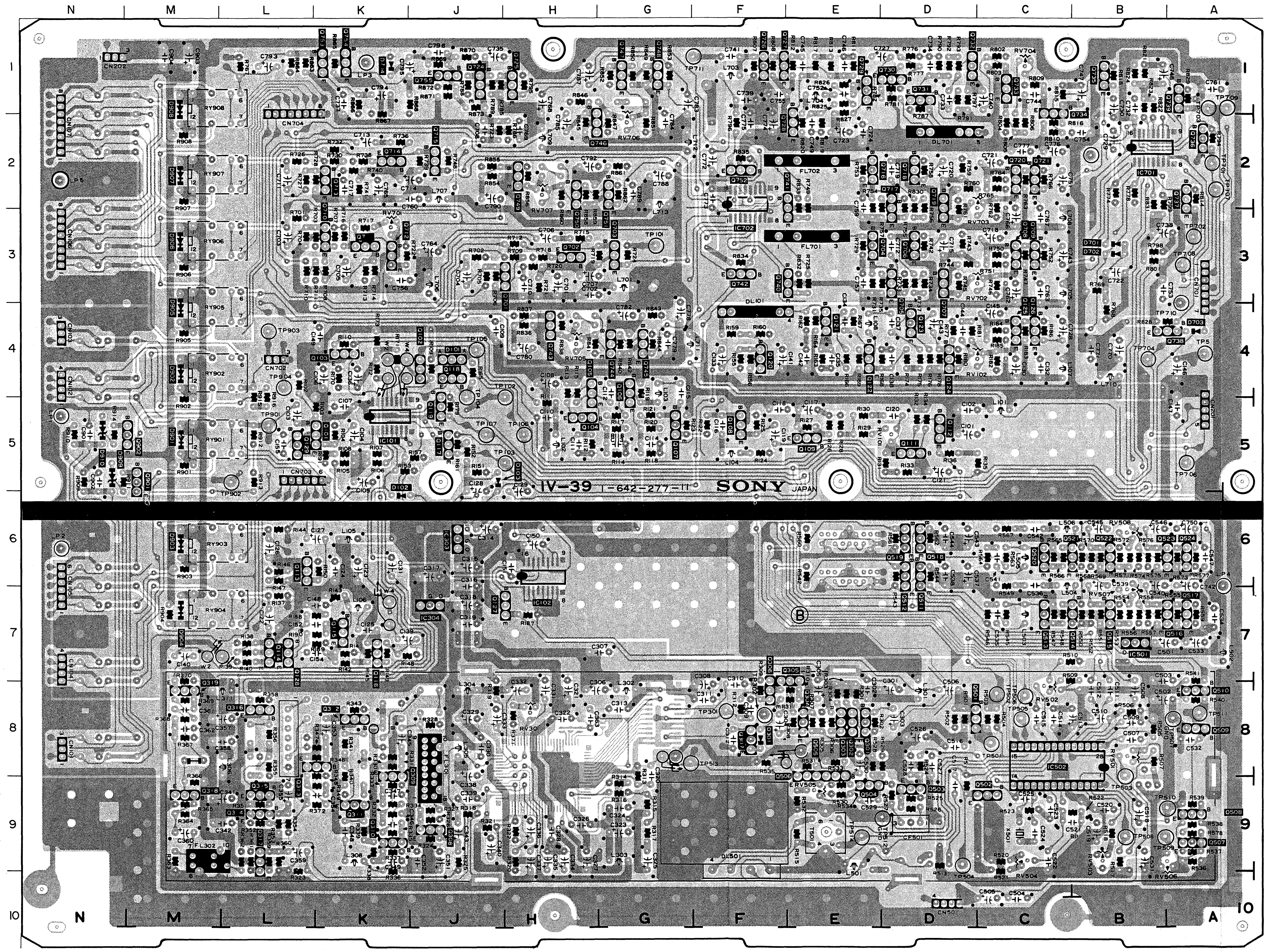

RE-84
RE-85
RP-67
RS-232C
S VIDEO IN
S VIDEO OUT
R/R-Y
B/B-Y
G/Y
VIDEO
SYNC
REF
EXT CONTR
TH OUT IN
OUT
IN
PR-01
PR-02
PR-03
PR-04
IR-01
IR-02
IR-03
IR-04
IR-05
IR-06
IR-07
AC IN
PP-02
POWER
S701
PP-01
W001
W002
W003
W004
S702
T702
P.T
240V
230V
220V
VOLTAGE SELECTOR
M701
FAN MOTOR
PS-271
IP-01
IP-02
IV-39
IF-01
IF-02
IF-03
IF-04
PF-01
PF-02
FP-01
FP-02
FV-01
FV-02
FV-03
FV-04
IV-02
FP-42
VR-126
VR-127

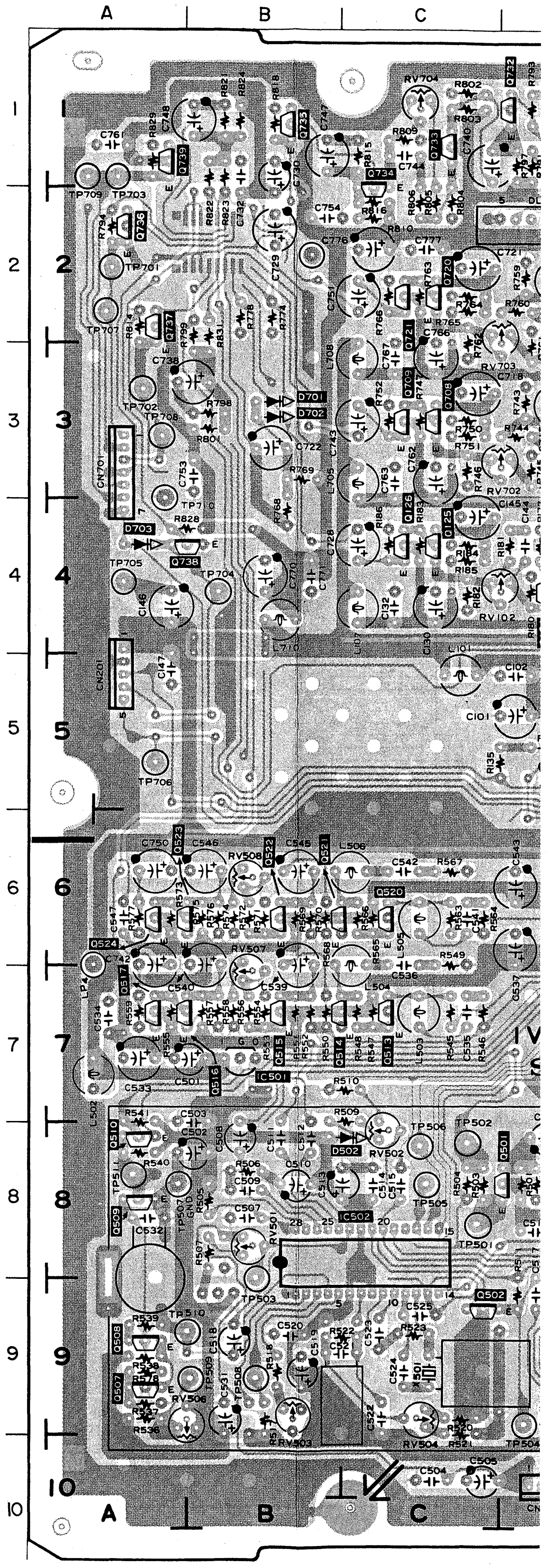

14
15
16
17
18
19
REF
EXT CONTR
CN301
CN519
1 3 2
W519
R/R-Y IN
GND
G/Y IN
GND
W520
B/B-Y IN
GND
SYNC IN
GND
B/B-Y OUT
GND
SYNC OUT
GND
CN702 3P I 2.0 EL YEL
REF OUT
N.C.
GND
IF-01
CN902 3P I 2.0 EL YEL
REF IN
N.C.
GND
CN703 6P I 2.0 EL WHT
Y (S) IN
GND
C (S) IN
GND
VIDEO IN
GND
IF-02
CN402 6P I 2.0 EL WHT
Y (S) OUT
GND
C (S) OUT
GND
VIDEO OUT
GND
CN704 8P I 2.0 EL RED
R/R-Y IN
GND
G/Y IN
GND
B/B-Y IN
GND
SYNC IN
GND
IF-03
CN401 8P I 2.0 EL RED
R/R-Y OUT
GND
G/Y OUT
GND
B/B-Y OUT
GND
SYNC OUT
GND
CN102 7P I 2.0 EL WHT
Y IN
GND
R-Y IN
GND
B-Y IN
GND
ACK
FM-30
IF-04
CN101 7P I 2.0 EL RED
9V IN
GND
5V IN
GND
-9V IN
GND
DIP B
FV-02
CN903 12P I 2.0 EL WHT
SCK
MS DATA
FM CS
RESET
FREEZE
EVEN/ODD O
FI/FR
MULTI
COMP/RGB
AFC 2
AFC 1
MOSAIC 2
CN904 2P I 2.0 EL WHT
EVEN/ODD I
VIDEO EXIST
CN301 3P L 2.0 EL WHT
V.LEVEL
N.C.
GND
CN403 3P I 2.0 EL BLK
ON/OFF
SET UP
GND
CN901 5P L 2.0 EL WHT
5V
H PHASE
GND
SC PHASE
0°/180°

Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

4-2. PRINTED WIRING BOARDS AND SCHEMATIC DIAGRAMS

IV-39 (INPUT VIDEO)


N
M
L
K
J
H
G
F
E
D
C
B
A
1
2
3
4
5
6
7
8
9
10
IV-39 1-642-277-11
SONY
JAPAN
IC101
IC102
IC501
IC502
IC701
IC702
FL701
FL702
DL101
DL501
DL701
CN704
CN703
CN702
CN501
RY901
RY902
RY903
RY904
RY905
RY906
RY907
RY908
TP901
TP902
TP903
TP904


A
B
C
1
2
3
4
5
6
7
8
9
10
IC502
RV704
RV502
RV504

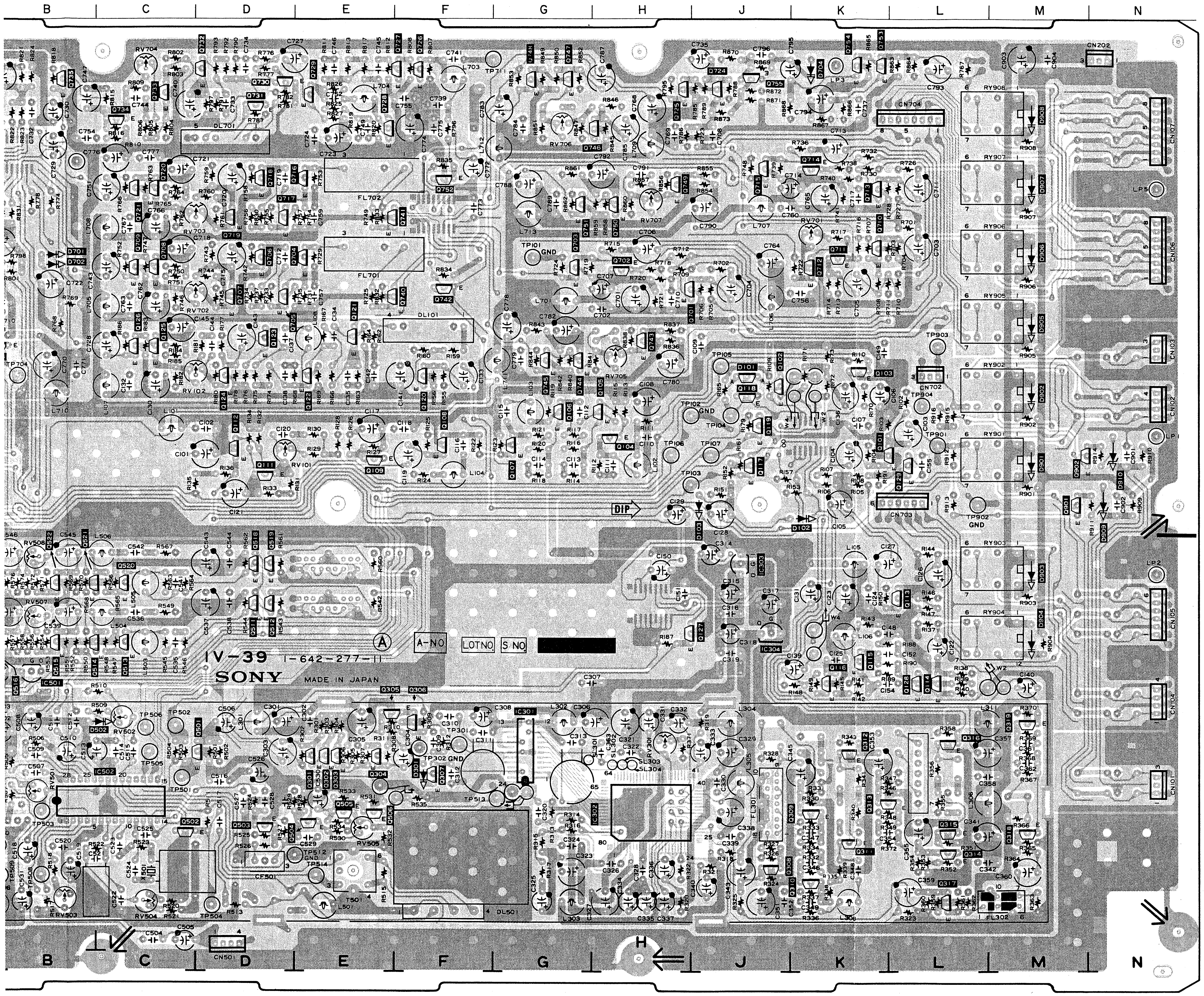
INPUT VIDEO
IV-39

INPUT VIDEO
IV-39

IV-39 —SOLDERING SIDE—
1-642-277-11

▨ : Soldering side

▨ : Component side

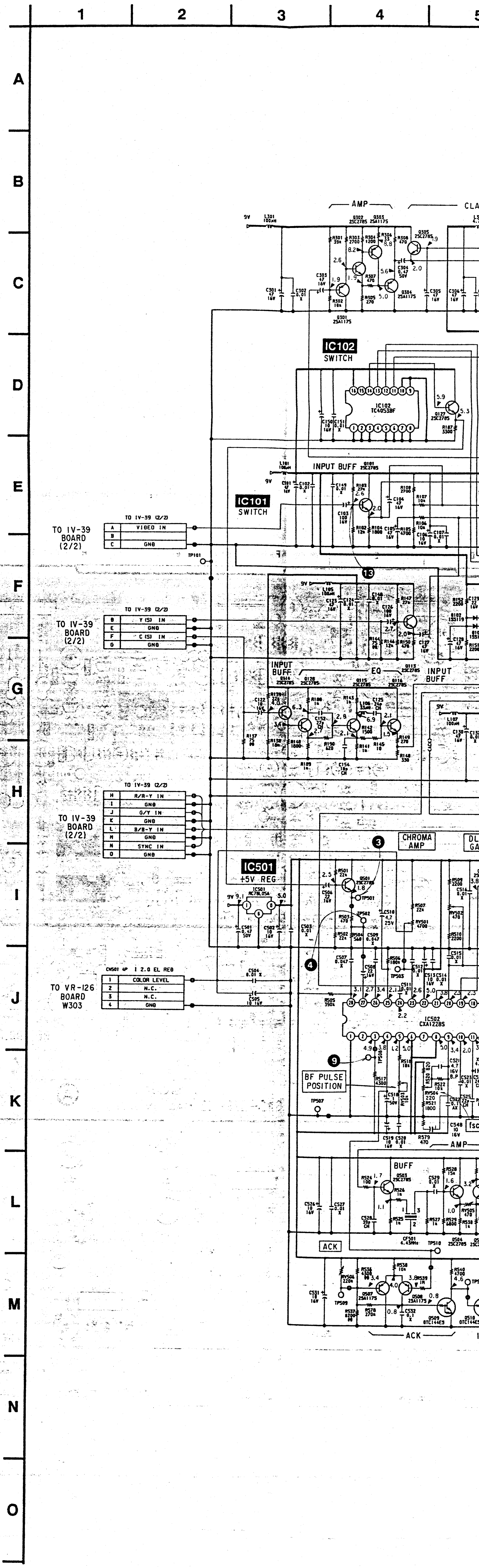


IV-39 —COMPONENT SIDE—
1-642-277-11

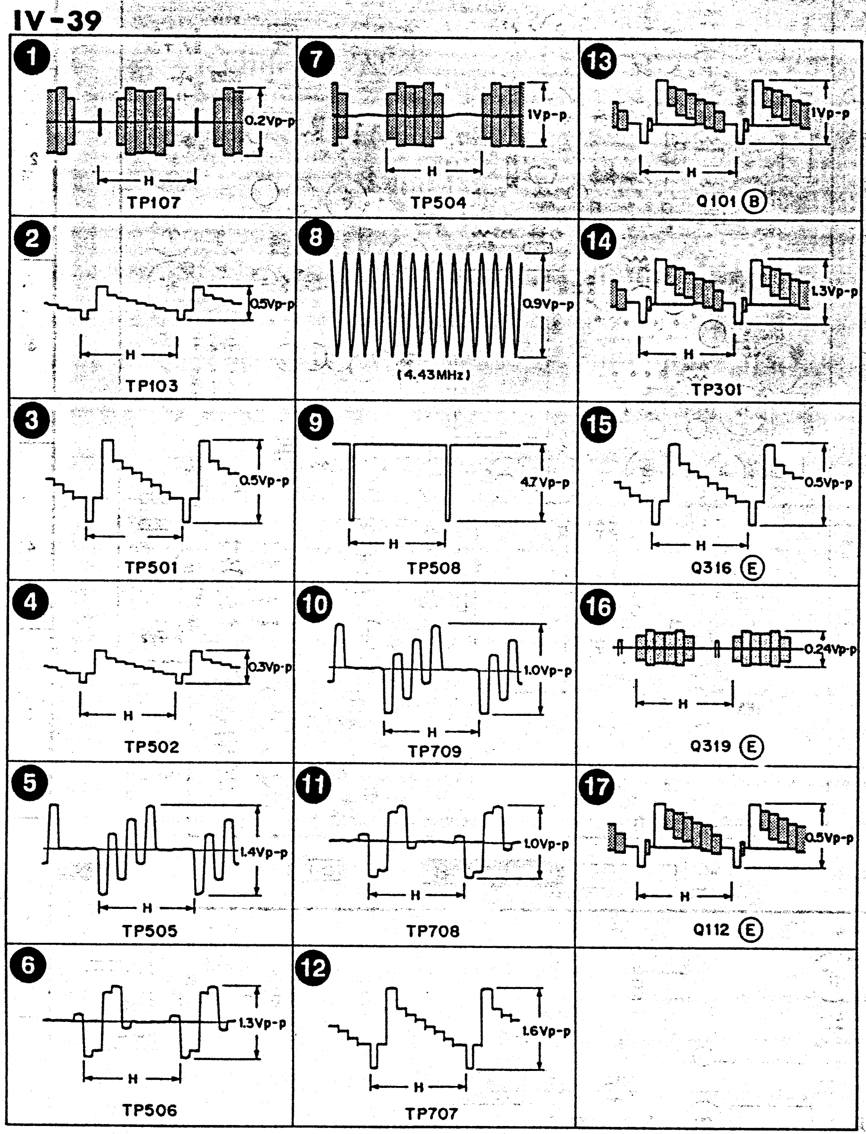
IV-39 Board

CF501	D-9
CN101	N-8
CN102	N-4
CN103	N-4
CN104	N-7
CN105	N-7
CN106	N-3
CN107	N-2
CN201	A-5
CN202	N-1
CN501	C-10
CN701	A-3
CN702	L-4
CN703	L-5
CN704	L-1
D101	J-4
D102	K-6
D103	J-6
D301	F-8
D701	B-3
D702	B-3
D703	A-4
D704	K-1
D901	M-5
D902	M-4
D903	M-6
D904	M-6
D905	M-4
D906	M-3
D907	M-2
D908	M-1
D909	N-5 S
D910	N-5 S
DL101	F-3
DL501	G-9
DL701	D-2
FL301	J-8
FL302	M-10
FL701	E-3
FL702	E-2
IC101	K-5 S
IC102	H-7 S
IC301	G-7
IC302	H-8
IC304	J-7
IC501	B-7
IC592	C-8
IC701	B-2 S
IC702	F-3 S
L101	C-4
L102	H-5
L103	G-4
L104	F-5
L105	K-6
L106	K-7
L107	C-4
L108	E-4
L301	D-8
L302	G-7
L303	G-10
L304	J-7
L305	J-8
L306	L-8
L307	K-9
L308	K-9
L311	L-7
L501	E-9
L502	A-7
L503	C-7
L504	C-7
L505	C-6
L506	C-6
L701	G-3
L703	F-1
L704	E-1
L705	B-3
L706	J-3
L707	J-2
L708	B-3
L709	H-2
L710	B-4
L711	G-4
L712	F-2
L713	G-3
LP1	N-5
LP2	N-6
LP3	K-1
LP4	A-7
LP5	N-2
Q101	K-5
Q102	H J
Q103	K-4
Q104	H-5
Q105	H-4
Q106	G-4
Q107	G-5
Q108	F-5
Q109	E-5
Q111	D-5
Q112	D-5
Q113	L-6
Q114	L-7
Q115	K-7
Q116	K-7
Q117	J-5
Q0118	J-4
Q119	J-5
Q120	F-4
Q121	E-3
Q122	E-4
Q123	D-4
Q124	D-4
Q125	C-4
Q126	C-4
Q127	J-7
Q128	L-7
Q129	L-5
Q301	E-8
Q302	E-8
Q303	E-8
Q304	E-8
Q305	E-7
Q306	F-7
Q307	F-8
Q308	J-9
Q309	J-8
Q310	J-9
Q311	K-9
Q312	K-8
Q313	K-8
Q314	L-9
Q315	L-9
Q316	L-8
Q317	L-9
Q318	M-9
Q319	M-8
Q501	D-8
Q502	C-9
Q503	D-9
Q504	D-9
Q505	E-8
Q506	E-9
Q507	A-9
Q508	A-9
Q509	A-8
Q510	A-8
Q511	D-7
Q512	D-7
Q513	C-7
Q514	B-7
Q515	B-7
Q516	B-7
Q517	A-7
Q518	E-6
Q519	E-6
Q520	C-6
Q521	B-6
Q522	B-6
Q523	A-6
Q524	A-6
Q701	J-3
Q702	H-3
Q703	G-3
Q704	D-3
Q705	D-4
Q706	D-3
Q707	D-3
Q708	C-2
Q709	C-2
Q710	K-3
Q711	K-3
Q712	K-3
Q713	K-2
Q714	K-2
Q715	J-2
Q716	D-2
Q717	D-2
Q718	D-2
Q719	D-3
Q720	C-2
Q721	C-2
Q724	J-1
Q725	H-1
Q726	F-1
Q727	F-1
Q728	E-1
Q729	E-1
Q730	D-1
Q731	D-1
Q732	D-1
Q733	C-1
Q734	C-1
Q735	B-1
Q736	A-2
Q737	A-2
Q738	B-4
Q739	B-4
Q740	F-3
Q741	F-2
Q742	F-3
Q743	H-4
Q744	G-4
Q745	G-4
Q746	H-2
Q747	G-1
Q748	G-1
Q749	H-2
Q750	H-3
Q751	G-3
Q752	F-2
Q753	K-1
Q754	K-1
Q755	J-1
Q901	M-5
Q902	M-5
RV101	E-5
RV102	D-4
RV301	H-8
RV501	B-8
RV502	C-8
RV503	B-9
RV504	C-9
RV505	E-9
RV506	B-9
RV507	B-6
RV508	B-6
RV701	K-3
RV702	D-3
RV703	D-3
RV704	C-1
RV705	H-4
RV706	G-2
RV707	H-3
RY901	M-5
RY902	M-4
RY903	M-6
RY904	M-7
RY905	M-3
RY906	M-3
RY907	M-2
RY908	M-1
T501	E-9
TP101	G-3
TP102	J-4
TP103	J-5
TP104	J-5
TP105	J-4
TP106	H-5
TP107	J-5
TP301	F-5
TP302	F-8
TP501	C-8
TP502	C-8
TP503	B-9
TP504	D-10
TP505	C-8
TP506	C-8
TP507	A-8
TP508	B-9
TP509	B-9
TP510	B-9
TP511	A-8
TP512	E-9
TP513	F-8
TP514	E-9
TP701	A-2
TP702	A-3
TP703	A-1
TP704	B-4
TP705	A-4
TP706	A-5
TP707	A-1
TP708	A-3
TP709	A-1
TP710	B-4
TP901	L-5
TP902	L-5
TP903	L-4
TP904	L-4
X501	C-9

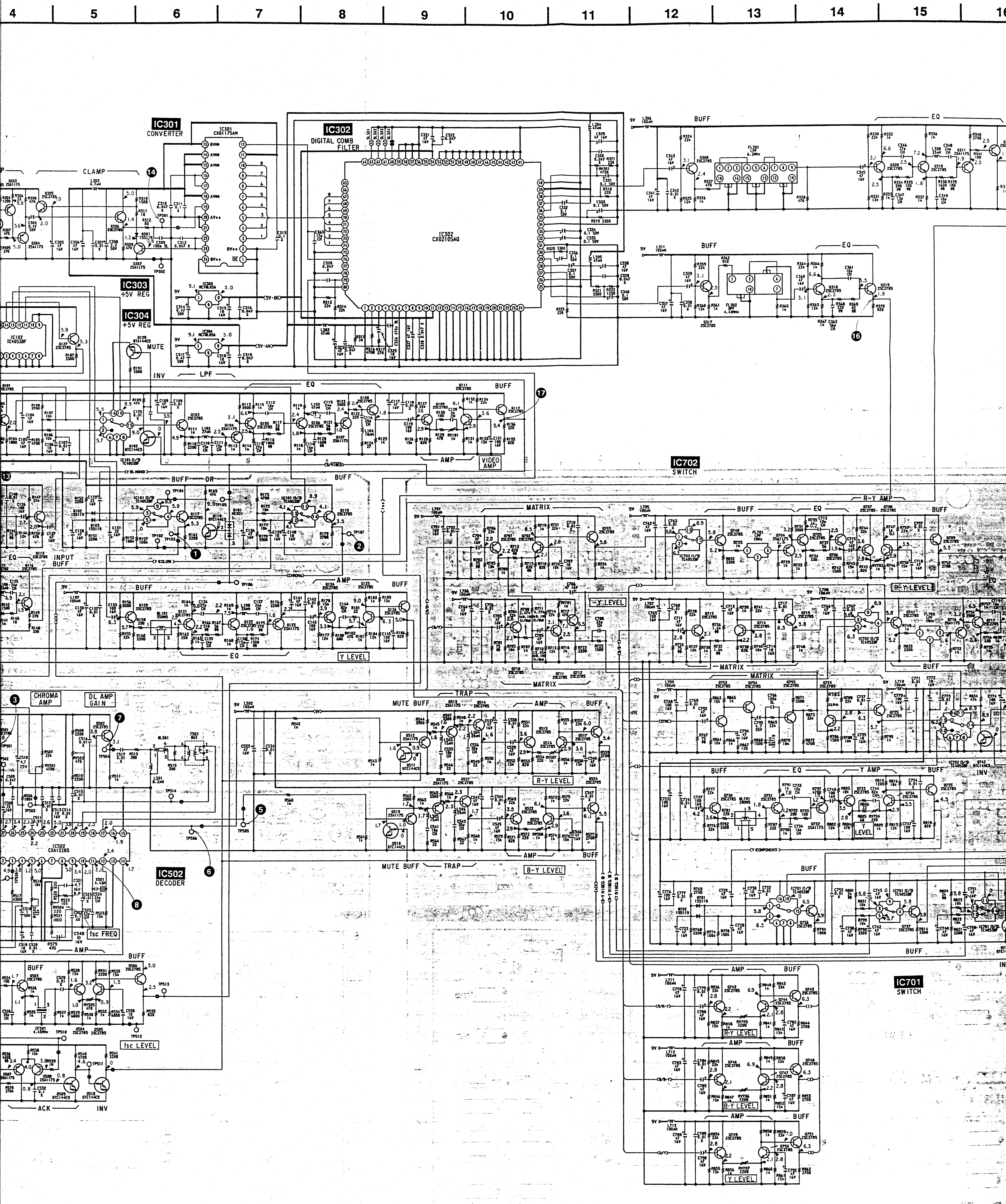
IV-39 (INPUT VIDEO)

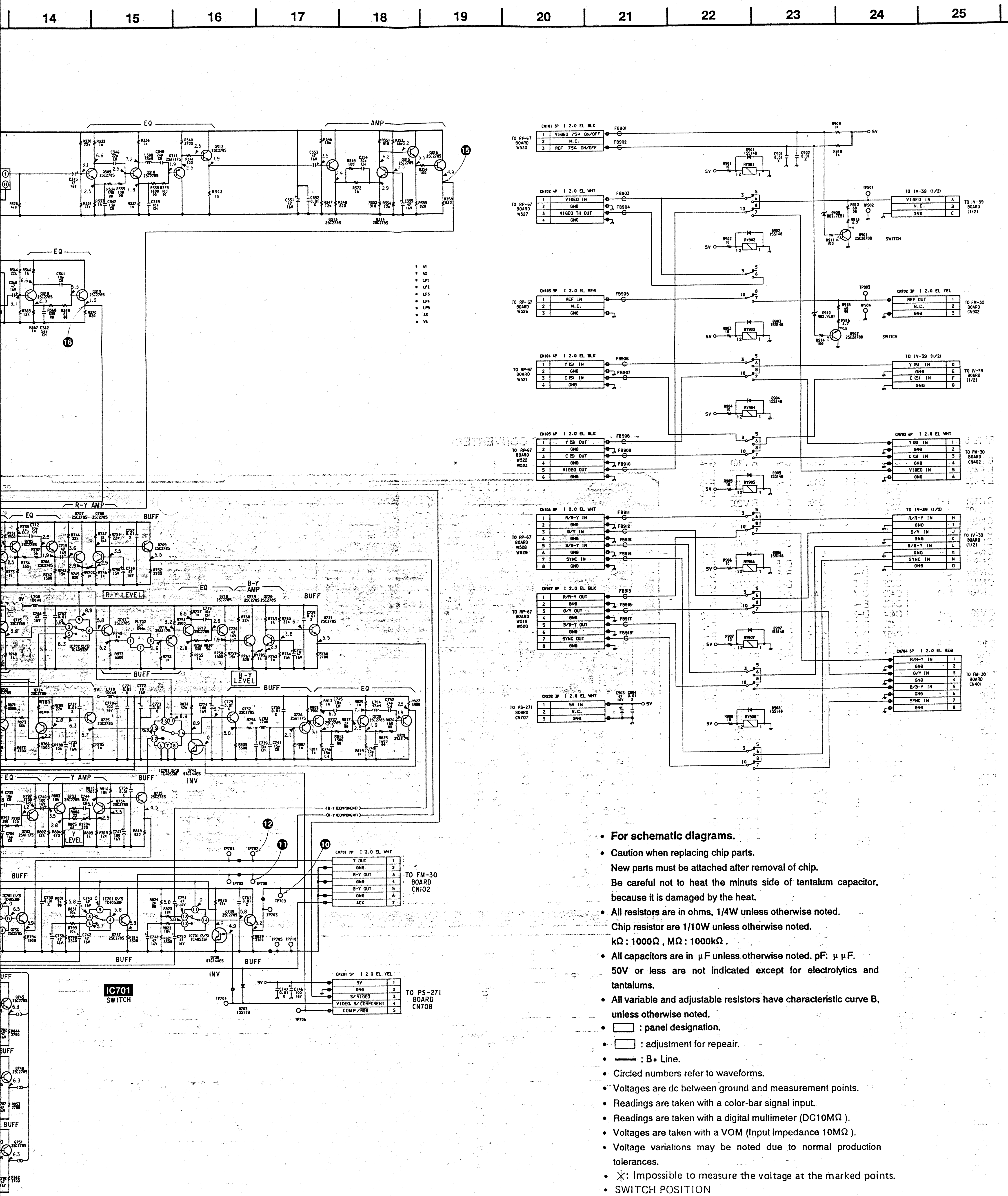

1
2
3
4
A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
AMP
CLA
IC102
SWITCH
IC102
TC4053BF
INPUT BUFF
IC101
SWITCH
TO IV-39 BOARD (2/2)
VIDEO IN
GND
Y (S) IN
C (S) IN
R/R-Y IN
G/Y IN
B/B-Y IN
SYNC IN
INPUT BUFF
EQ
INPUT BUFF
CHROMA AMP
IC501
+5V REG
IC502
CXA1228S
BF PULSE POSITION
BUFF
AMP
ACK
TO VR-126 BOARD W303
COLOR LEVEL
N.C.
TP101
TP507
TP509
TP510

IV-39


❶
0.2Vp-p
H
TP107
❼
1Vp-p
H
TP504
⓭
1Vp-p
H
Q101 Ⓑ
❷
0.5Vp-p
H
TP103
❽
0.9Vp-p
(4.43MHz)
⓮
1.3Vp-p
H
TP301
❸
0.5Vp-p
H
TP501
❾
4.7Vp-p
H
TP508
⓯
0.5Vp-p
H
Q316 Ⓔ
❹
0.3Vp-p
H
TP502
❿
1.0Vp-p
H
TP709
⓰
0.24Vp-p
H
Q319 Ⓔ
❺
1.4Vp-p
H
TP505
⓫
1.0Vp-p
H
TP708
⓱
0.5Vp-p
H
Q112 Ⓔ
❻
1.3Vp-p
H
TP506
⓬
1.6Vp-p
H
TP707

Sony SP0215

4
5
6
7
8
9
10
11
12
13
14
15
IC301
CONVERTER
IC301
CXD1175AM
CLAMP
IC302
DIGITAL COMB
FILTER
IC302
CXD2105AQ
IC303
+5V REG
IC304
+5V REG
MUTE
INV
LPF
EQ
BUFF
AMP
VIDEO
AMP
OR
INPUT
BUFF
Y LEVEL
IC702
SWITCH
MATRIX
R-Y AMP
R-Y LEVEL
-Y LEVEL
B-Y LEVEL
Y AMP
TRAP
MUTE BUFF
CHROMA
AMP
DL AMP
GAIN
IC502
DECODER
IC502
CXA1228S
fsc FREQ
fsc LEVEL
ACK
IC701
SWITCH
Y LEVEL
INV


14
15
16
17
18
19
20
21
22
23
24
25
EQ
AMP
R-Y AMP
B-Y AMP
Y AMP
BUFF
INV
R-Y LEVEL
B-Y LEVEL
Y LEVEL
IC701
SWITCH
TO RP-67 BOARD W530
TO RP-67 BOARD W527
TO RP-67 BOARD W526
TO RP-67 BOARD W521
TO RP-67 BOARD W522 W523
TO RP-67 BOARD W528 W529
TO RP-67 BOARD W519 W520
TO PS-271 BOARD CN707
TO IV-39 BOARD (1/2)
TO FM-30 BOARD CN902
TO FM-30 BOARD CN402
TO FM-30 BOARD CN401
TO FM-30 BOARD CN102
TO PS-271 BOARD CN708
SWITCH
5V
9V

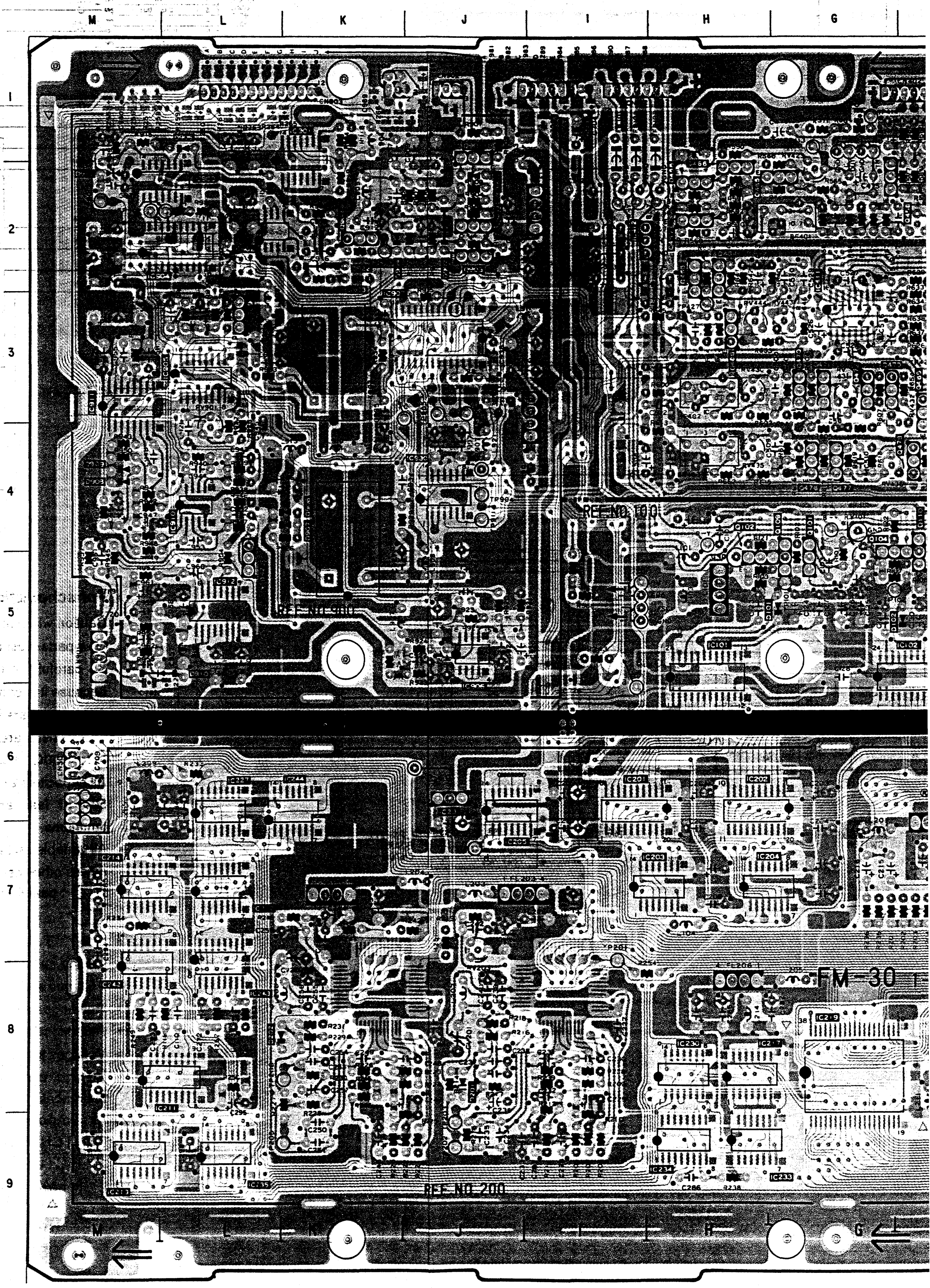
- **For schematic diagrams.**
- Caution when replacing chip parts.
  New parts must be attached after removal of chip.
  Be careful not to heat the minuts side of tantalum capacitor, because it is damaged by the heat.
- All resistors are in ohms, 1/4W unless otherwise noted.
  Chip resistor are 1/10W unless otherwise noted.
  kΩ : 1000Ω , MΩ : 1000kΩ .
- All capacitors are in μF unless otherwise noted. pF: μμF.
  50V or less are not indicated except for electrolytics and tantalums.
- All variable and adjustable resistors have characteristic curve B, unless otherwise noted.
- ☐ : panel designation.
- ☐ : adjustment for repeair.
- —— : B+ Line.
- Circled numbers refer to waveforms.
- Voltages are dc between ground and measurement points.
- Readings are taken with a color-bar signal input.
- Readings are taken with a digital multimeter (DC10MΩ).
- Voltages are taken with a VOM (Input impedance 10MΩ).
- Voltage variations may be noted due to normal production tolerances.
- ⚹: Impossible to measure the voltage at the marked points.
- SWITCH POSITION

PICTURE EFFECT	OFF
MEMORY	FRAME
COLOR VIDEO SET UP	CLICK

FM-30 Board

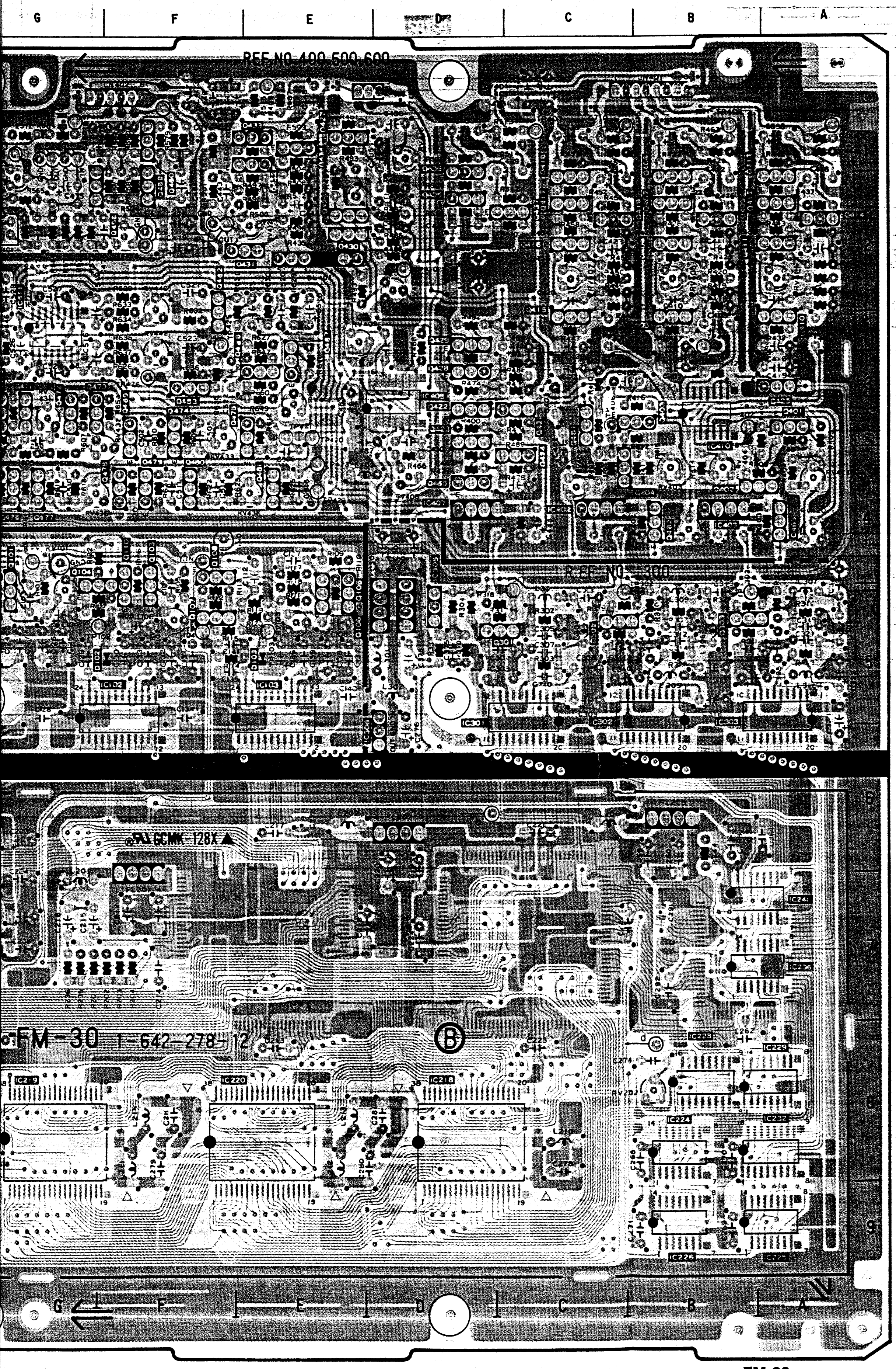
BF401	G-2	
BF402	H-2	
BF403	H-4	
CN101	I-1	
CN102	I-1	
CN301	M-6	
CN401	B-1	
CN402	F-1	
CN403	D-1	
CN901	M-5	
CN902	J-1	
CN903	L-1	
CN904	K-1	
CV201	J-8	
CV202	L-7	
D101	G-5	
D102	F-5	
D103	E-5	
D201	J-8	
D202	L-8	
D901	J-1	
D902	J-1	
D903	K-2	
D904	J-1	
D905	L-1	
D906	K-4	
D907	K-4	
D908	M-4	
D909	M-4	
D911	M-8	
D922	K-2	
D923	L-5	
DL401	E-2	
FL101	H-5	
FL201	F-6	
FL202	D-6	
FL203	I-7	
FL204	K-7	
FL205	B-6	
FL206	H-8	
FL301	E-5	
FL302	D-5	
FL901	I-3	
FL902	I-2	
IC101	H-5	S
IC102	F-5	S
IC103	E-5	S
IC201	I-6	
IC202	H-6	S
IC203	H-7	S
IC204	H-7	S
IC205	J-6	S
IC206	E-6	
IC207	C-6	
IC208	I-8	
IC209	K-8	
IC210	B-7	
IC211	L-8	S
IC212	M-7	S
IC213	M-7	S
IC214	L-7	S
IC215	L-7	S
IC217	H-8	S
IC218	D-8	S
IC219	G-8	S
IC220	E-8	S
IC221	D-8	
IC222	G-8	
IC223	F-8	
IC224	B-8	S
IC225	A-9	S
IC226	B-9	S
IC227	L-6	S
IC228	B-8	S
IC229	A-8	S
IC230	H-8	S
IC231	J-6	S
IC232	A-8	S
IC233	H-8	S
IC234	H-9	S
IC235	K-6	
IC236	A-7	S
IC240	L-9	S
IC241	A-7	S
IC242	M-9	
IC243	M-9	S
IC244	L-9	
IC301	D-5	S
IC302	D-5	S
IC303	B-5	S
IC305	D-4	
IC306	E-5	
IC402	C-4	
IC403	B-4	
IC404	D-3	
IC405	D-3	S
IC407	D-4	
IC410	B-3	S
IC411	G-2	S
IC412	H-2	
IC901	K-1	S
IC902	L-2	S
IC903	L-2	S
IC904	M-2	S
IC905	L-3	S
IC906	J-6	S
IC907	K-2	S
IC910	L-4	S
IC911	M-3	S
IC912	L-5	S
IC930	J-4	S
L101	H-5	
L103	H-5	
L104	H-7	
L201	G-7	
L202	E-6	
L203	J-7	
L204	J-7	
L205	G-7	
L206	C-6	
L207	J-8	
L208	L-8	
L209	L-6	
L210	C-8	
L211	F-10	
L212	E-9	
L213	E-8	
L214	H-8	
L215	F-8	
L301	D-5	
L302	D-5	
L303	C-5	
L304	C-5	
L305	B-4	
L306	B-5	
L307	A-4	
L308	A-5	
L402	D-4	
L403	F-1	
L404	H-1	
L405	D-2	
L410	I-3	
L411	I-2	
L901	I-4	
L902	L-2	
L903	I-1	
L904	K-1	
L905	K-1	
L906	M-2	
L907	J-5	
L908	J-4	
L909	K-2	
L910	K-4	
L911	J-3	
L913	K-4	
L914	M-2	
L915	L-5	
L921	J-4	
Q101	G-4	
Q102	H-4	
Q103	F-4	
Q104	G-4	
Q105	E-4	
Q106	E-4	
Q107	F-5	
Q108	F-4	
Q109	G-4	
Q110	F-4	
Q301	D-5	
Q302	B-5	
Q303	B-5	
Q401	A-3	
Q402	A-4	
Q403	B-3	
Q404	B-4	
Q405	B-3	
Q406	B-2	
Q407	B-2	
Q408	B-2	
Q409	B-2	
Q410	A-3	
Q411	A-2	
Q412	B-2	
Q413	B-2	
Q414	A-2	
Q415	C-3	
Q416	C-2	
Q417	C-2	
Q418	C-2	
Q419	C-2	
Q421	D-3	
Q422	D-3	
Q423	D-4	
Q424	C-4	
Q425	A-3	
Q427	D-1	
Q428	D-3	
Q429	D-3	
Q430	E-2	
Q431	E-2	
Q432	E-1	
Q433	E-1	
Q434	E-1	
Q435	D-2	
Q436	D-2	
Q437	D-2	
Q438	E-2	
Q455	H-2	
Q456	H-2	
Q457	H-2	
Q458	F-1	
Q459	F-1	
Q460	F-1	
Q461	C-3	
Q462	B-4	
Q463	D-4	
Q465	D-4	
Q466	H-2	
Q470	G-3	
Q471	G-3	
Q472	G-3	
Q473	F-3	
Q474	F-3	
Q475	F-3	
Q476	G-4	
Q477	G-4	
Q478	F-4	
Q479	F-4	
Q480	F-4	
Q481	E-4	
Q482	F-2	
Q483	F-3	
Q484	H-2	
Q485	H-2	
Q486	H-3	
Q487	E-3	
Q488	E-3	
Q489	F-3	
Q901	J-1	
Q902	J-2	
Q903	J-2	
Q904	K-2	
Q905	L-2	
RV101	G-4	
RV102	F-5	
RV103	E-5	
RV202	B-8	
RV203	J-7	
RV401	A-4	
RV402	C-4	
RV403	B-4	
RV404	B-4	
RV405	B-2	
RV406	B-2	
RV407	C-2	
RV408	D-4	
RV409	D-3	
RV410	D-1	
RV412	E-2	
RV416	F-2	
RV419	B-4	
RV420	A-4	
RV421	D-2	
RV423	G-2	
RV430	H-3	
RV431	G-3	
RV432	G-4	
RV433	F-4	
RV435	H-4	
RV436	F-4	
RV438	E-4	
RV440	F-2	
RV441	E-3	
RV442	F-3	
RV443	G-3	
RV444	H-3	
RV901	L-3	
TP101	G-5	
TP102	G-5	
TP103	E-5	
TP104	F-5	
TP201	I-7	
TP202	J-10	
TP203	J-10	
TP205	K-9	
TP206	L-8	
TP207	L-8	
TP301	C-5	
TP302	C-5	
TP303	A-5	
TP401	A-1	
TP402	B-3	
TP403	B-1	
TP404	B-3	
TP405	C-1	
TP406	C-3	
TP407	C-1	
TP409	E-1	
TP410	D-2	
TP411	F-1	
TP413	G-1	
TP414	G-1	
TP420	E-3	
TP421	E-3	
TP422	E-4	
TP423	E-4	
TP425	F-3	
TP426	F-3	
TP427	H-3	
TP901	M-2	
TP902	L-2	
TP903	K-2	
TP904	J-4	
TP905	K-2	
TP906	L-3	
TP907	J-4	
TP911	J-4	
X901	K-4	
X902	K-3	

FM-30 (D/A, A/D CONVERTER)

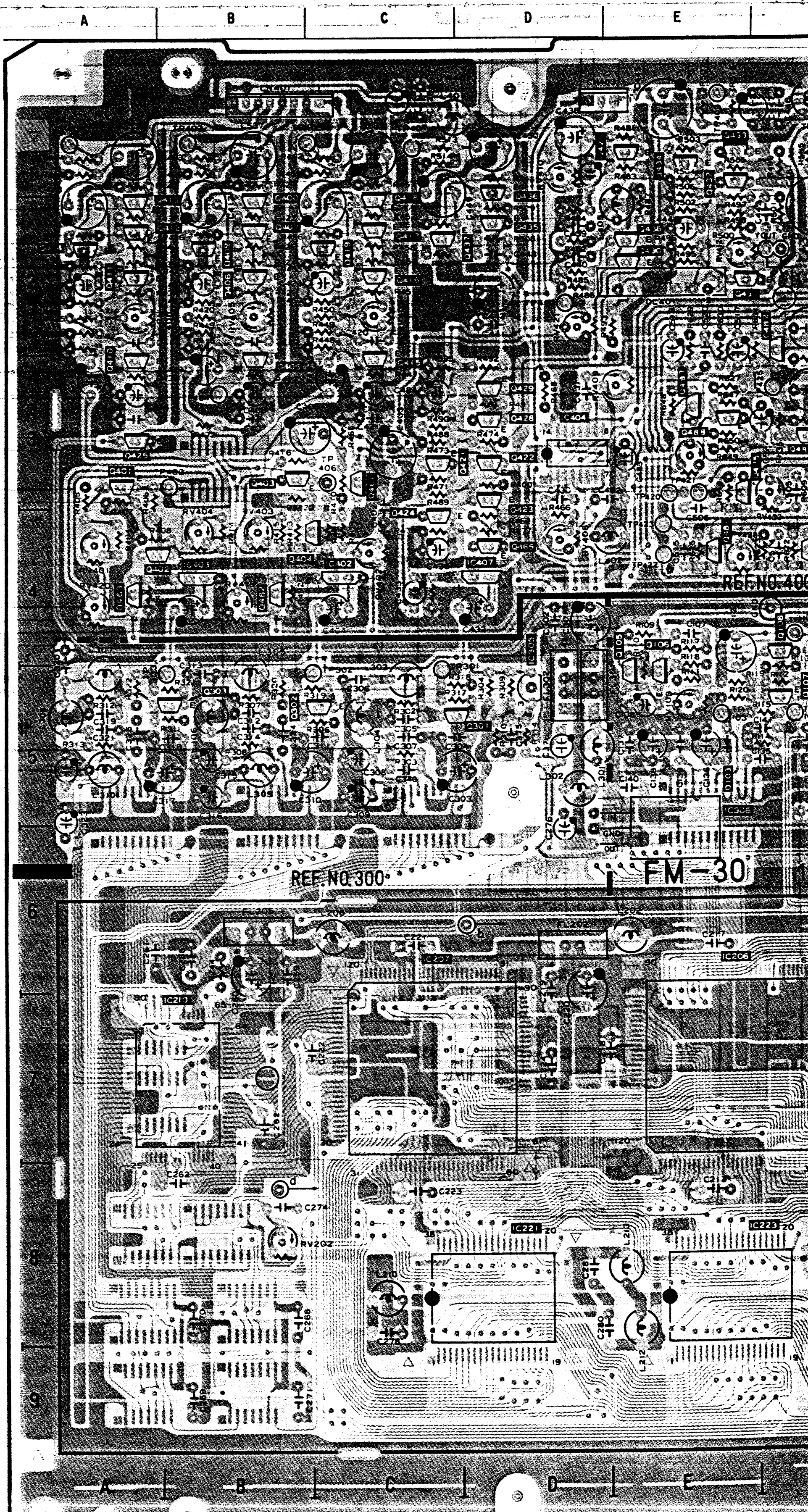


D/A,A/D CONVERTER D/A,A/D CONVERTER

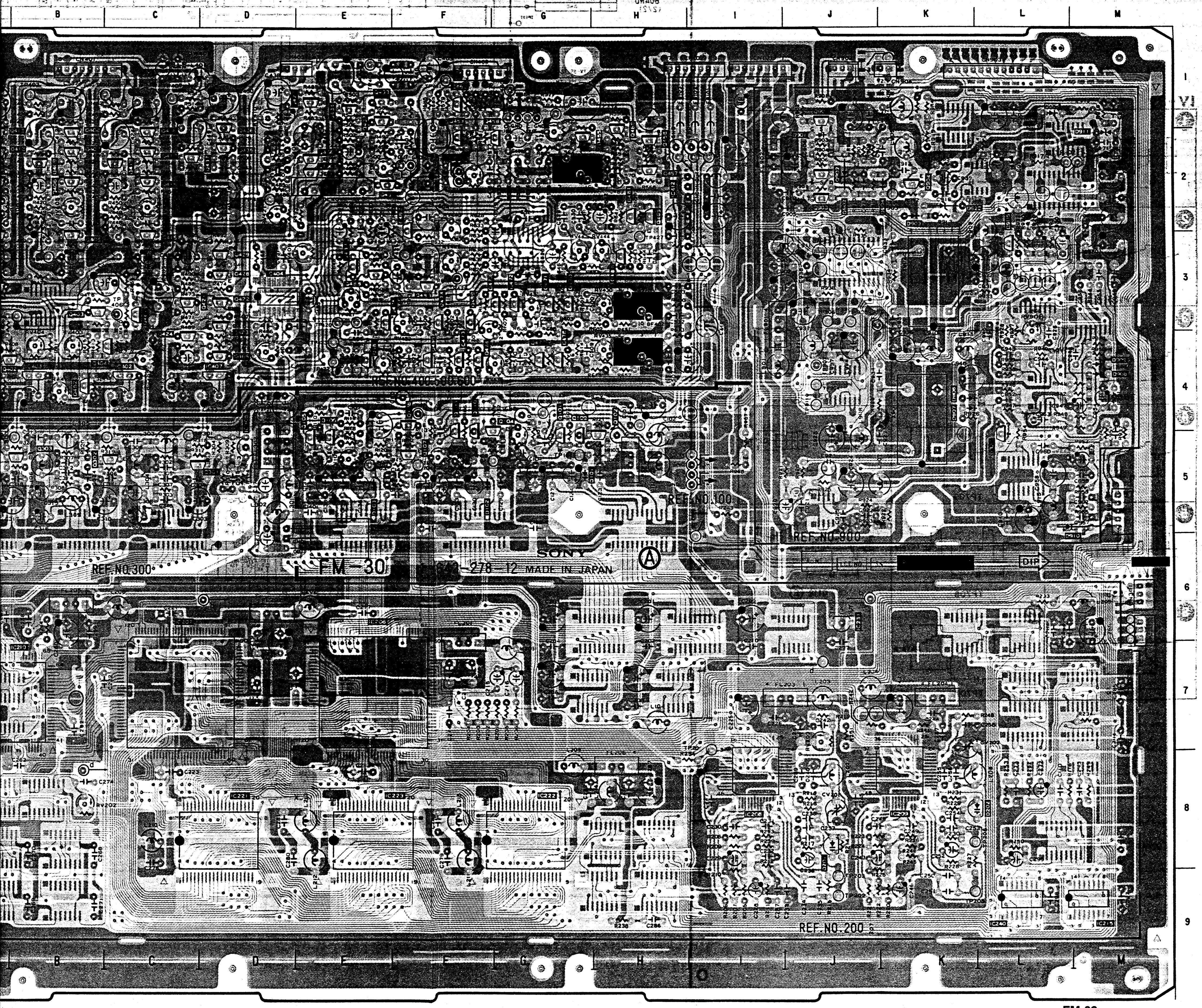
FM-30 FM-30


G
F
E
D
C
B
A
REF.NO.400,500,600
REF.NO.300
GCMK-128X
FM-30 1-642-278-12
Ⓑ

FM-30 —SOLDERING SIDE—
1-642-278-12


A
B
C
D
E
REF.NO.400
REF.NO.300
FM-30

- ▨ : Soldering side
- ░ : Component side

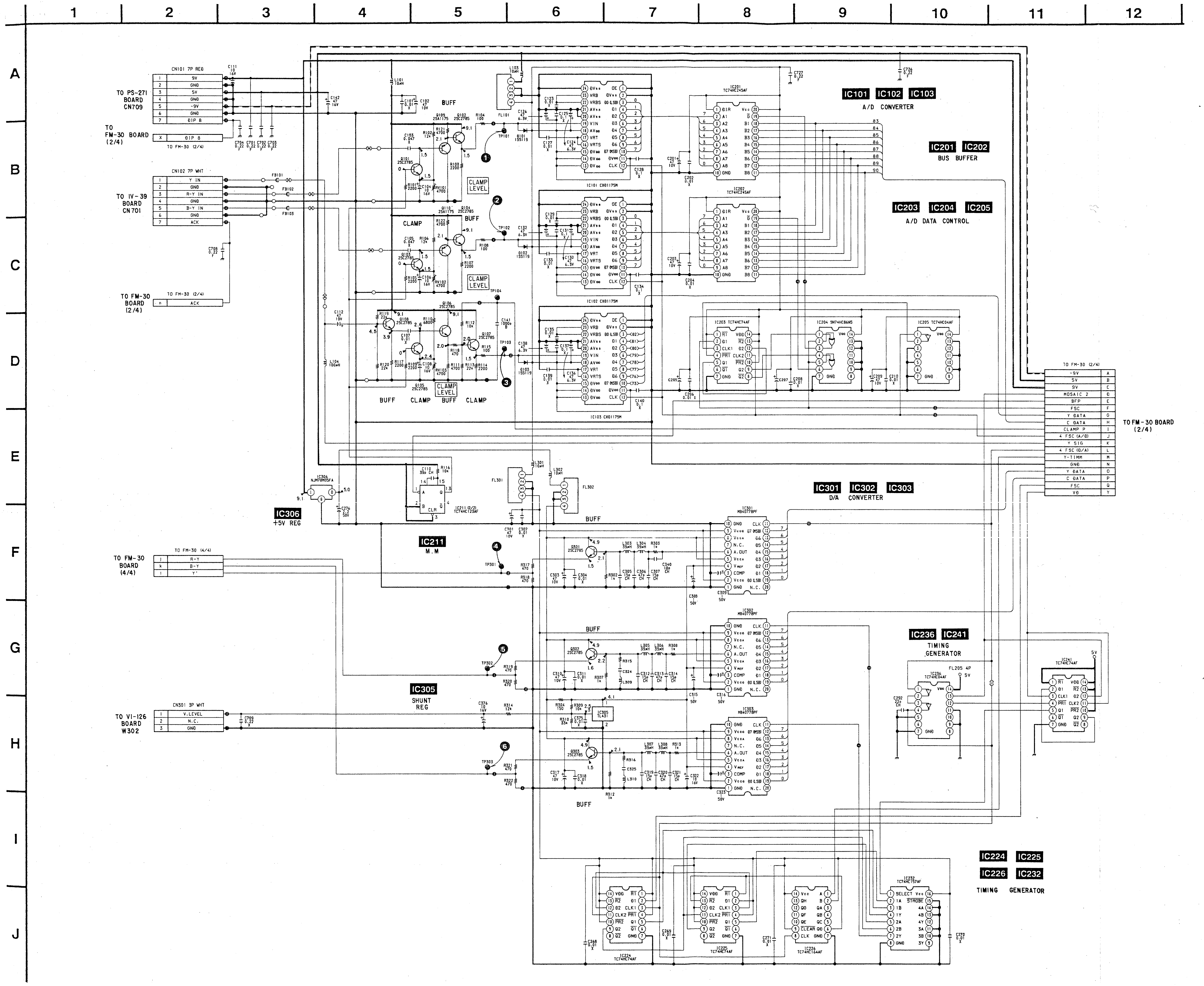

B
C
D
E
F
G
H
I
J
K
L
M
1
2
3
4
5
6
7
8
9
REF.NO.400,500,600
REF.NO.100
REF.NO.800
REF.NO.300
FM-30
SONY
1-642-278-12 MADE IN JAPAN
Ⓐ
DIP
REF.NO.200

FM-30 —COMPONENT SIDE—

1-642-278-12

D/A,A/D CONVERTER D/A,A/D CONVERTER

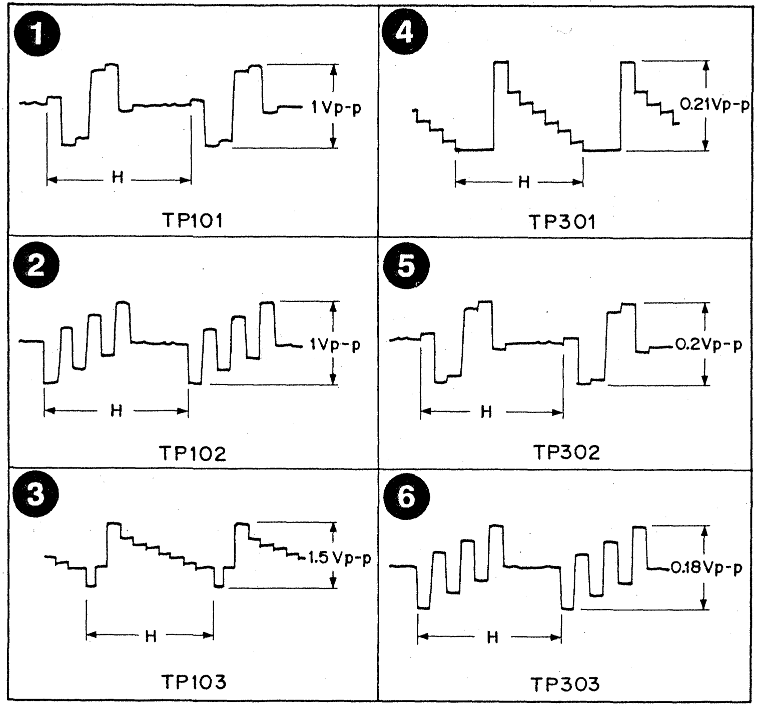
FM-30 (D / A , A / D CONVERTER)


1
2
3
4
5
6
7
8
9
10
11
12
A
B
C
D
E
F
G
H
I
J
TO PS-271 BOARD CN709
CN101 7P RED
1 9V
2 GND
3 5V
4 GND
5 -9V
6 GND
7 DIP 8
TO FM-30 BOARD (2/4)
X DIP 8
TO FM-30 (2/4)
C111 10 16V
C704 0.22 F
C701 0.22 F
C702 0.22 F
C703 0.22 F
TO IV-39 BOARD CN701
CN102 7P WHT
1 Y IN
2 GND
3 R-Y IN
4 GND
5 B-Y IN
6 GND
7 ACK
FB101
FB102
FB103
C708 0.22 F
TO FM-30 BOARD (2/4)
TO FM-30 (2/4)
n ACK
BUFF
CLAMP
CLAMP LEVEL
BUFF
CLAMP
CLAMP LEVEL
BUFF CLAMP BUFF CLAMP
CLAMP LEVEL
TP101
TP102
TP103
TP104
FL101
IC101 CX01175M
IC102 CX01175M
IC103 CX01175M
IC201 TC74HC245AF
IC202 TC74HC245AF
IC203 TC74HC74AF
IC204 SN74HC86NS
IC205 TC74HC04AF
IC101 IC102 IC103
A/D CONVERTER
IC201 IC202
BUS BUFFER
IC203 IC204 IC205
A/D DATA CONTROL
TO FM-30 (2/4)
-9V A
5V B
9V C
MOSAIC 2 D
BFP E
FSC F
Y DATA G
C DATA H
CLAMP P I
4 FSC (A/D) J
Y SIG K
4 FSC (D/A) L
Y-TIMM M
GND N
Y DATA O
C DATA P
FSC Q
VD Y
TO FM-30 BOARD (2/4)
IC306 NJM78M05FA
IC306
+5V REG
IC211 (2/2) TC74HC123AF
IC211
M.M
FL301
FL302
IC301 MB40778PF
IC302 MB40778PF
IC303 MB40778PF
IC301 IC302 IC303
D/A CONVERTER
BUFF
BUFF
BUFF
TP301
TP302
TP303
TO FM-30 BOARD (4/4)
TO FM-30 (4/4)
i R-Y
k B-Y
l Y'
IC305
SHUNT REG
IC305 TL431
TO VI-126 BOARD W302
CN301 3P WHT
1 V.LEVEL
2 N.C.
3 GND
IC236 IC241
TIMING GENERATOR
IC236 TC74HC04AF
IC241 TC74HC74AF
FL205 4P
5V
IC224 IC225
IC226 IC232
TIMING GENERATOR
IC224 TC74HC74AF
IC225 TC74HC74AF
IC226 TC74HC164AF
IC232 TC74HC157AF

- **For schematic diagrams.**
- Caution when replacing chip parts.
  New parts must be attached after removal of chip.
  Be careful not to heat the minuts side of tantalum capacitor, because it is damaged by the heat.
- All resistors are in ohms, 1/4W unless otherwise noted.
  Chip resistor are 1/10W unless otherwise noted.
  kΩ : 1000Ω , MΩ : 1000kΩ .
- All capacitors are in μF unless otherwise noted. pF: μ μF.
  50V or less are not indicated except for electrolytics and tantalums.
- All variable and adjustable resistors have characteristic curve B, unless otherwise noted.
- ☐ : panel designation.
- ☐ : adjustment for repeair.
- —— : B+ Line.
- Circled numbers refer to waveforms.
- Voltages are dc between ground and measurement points.
- Readings are taken with a color-bar signal input.
- Readings are taken with a digital multimeter (DC10MΩ).
- Voltages are taken with a VOM (Input impedance 10MΩ).
- Voltage variations may be noted due to normal production tolerances.
- ✻: Impossible to measure the voltage at the marked points.
- SWITCH POSITION

PICTURE EFFECT	OFF
MEMORY	FRAME
COLOR VIDEO SET UP	CLICK

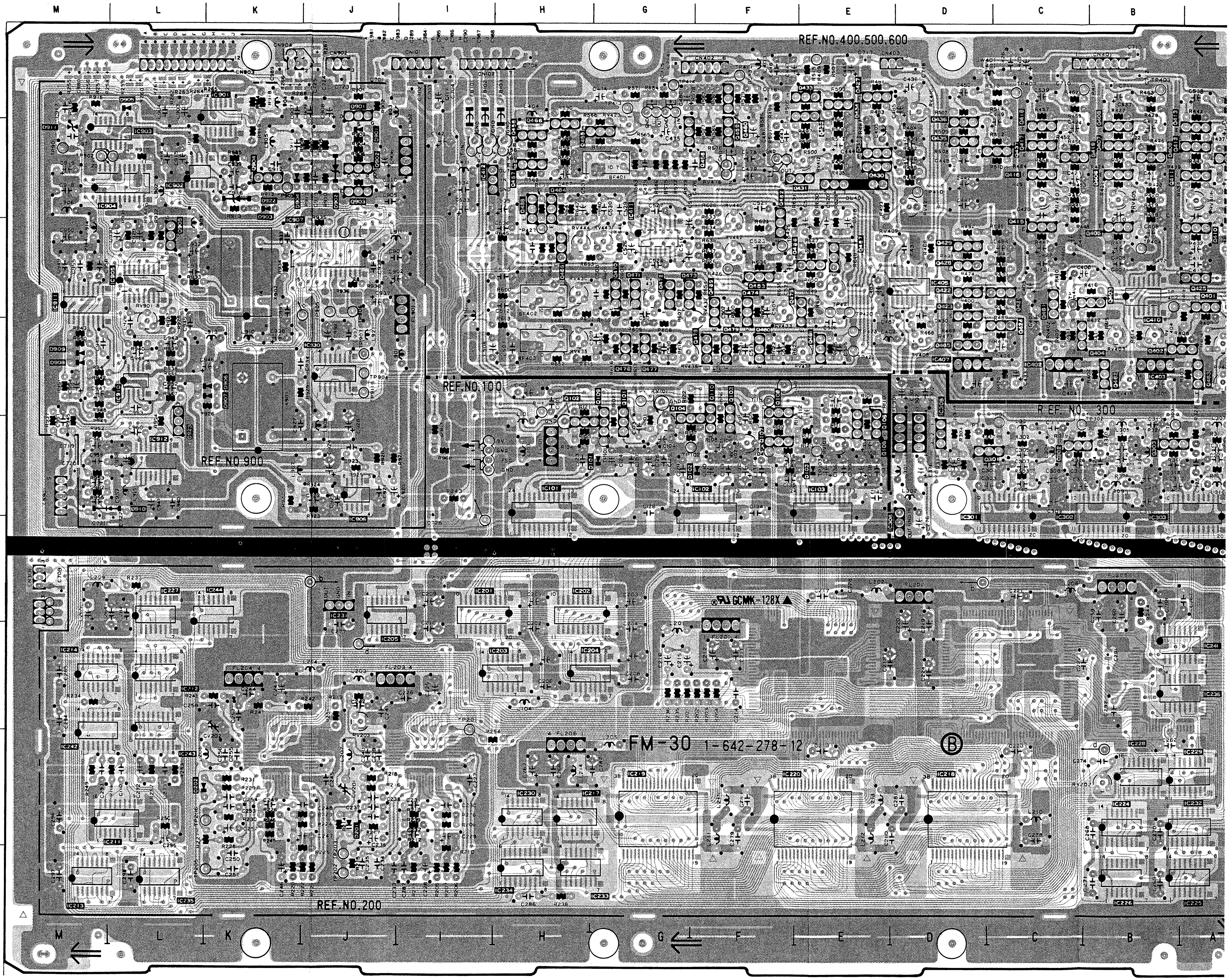
FM-30



FM-30 Board

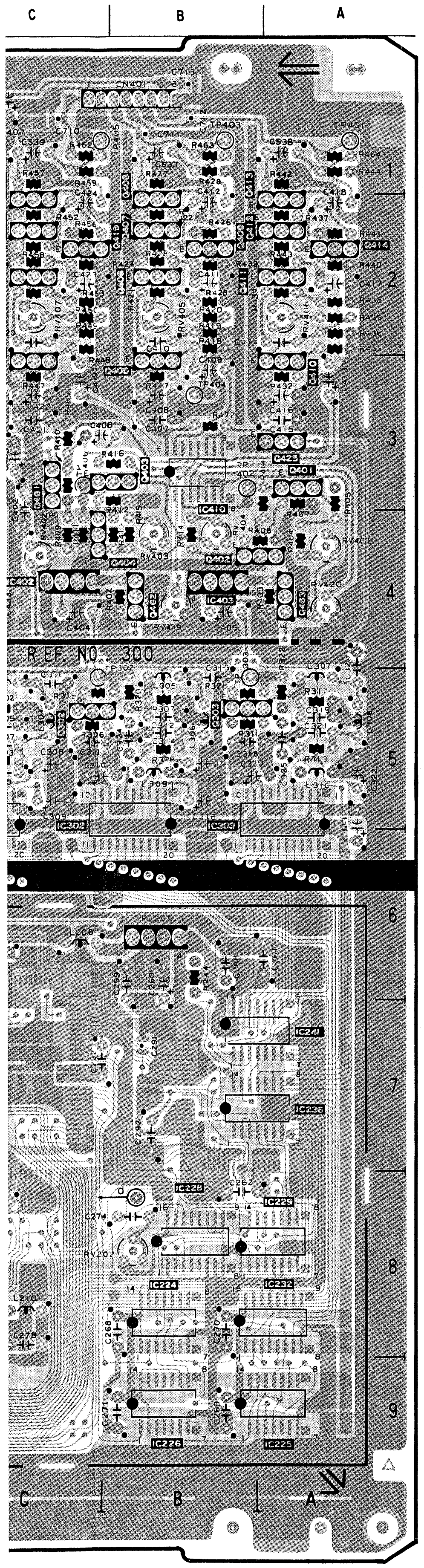
BF401	G-2
BF402	H-2
BF403	H-4
CN101	I-1
CN102	I-1
CN301	M-6
CN401	B-1
CN402	F-1
CN403	D-1
CN901	M-5
CN902	J-1
CN903	L-1
CN904	K-1
CV201	J-8
CV202	L-7
D101	G-5
D102	F-5
D103	E-5
D201	J-8
D202	L-8
D901	J-1
D902	J-1
D903	K-2
D904	J-1
D905	L-1
D906	K-4
D907	K-4
D908	M-4
D909	M-4
D911	M-8
D922	K-2
D923	L-5
DL401	E-2
FL101	H-5
FL201	F-6
FL202	D-6
FL203	I-7
FL204	K-7
FL205	B-6
FL206	H-8
FL301	E-5
FL302	D-5
FL901	I-3
FL902	I-2
IC101	H-5 S
IC102	F-5 S
IC103	E-5 S
IC201	I-6
IC202	H-6 S
IC203	H-7 S
IC204	H-7 S
IC205	J-6 S
IC206	E-6
IC207	C-6
IC208	I-8
IC209	K-8
IC210	B-7
IC211	L-8 S
IC212	M-7 S
IC213	M-7 S
IC214	L-7 S
IC215	L-7 S
IC217	H-8 S
IC218	D-8 S
IC219	G-8 S
IC220	E-8 S
IC221	D-8
IC222	G-8
IC223	F-8
IC224	B-8 S
IC225	A-9 S
IC226	B-9 S
IC227	L-6 S
IC228	B-8 S
IC229	A-8 S
IC230	H-8 S
IC231	J-6 S
IC232	A-8 S
IC233	H-8 S
IC234	H-9 S
IC235	K-6
IC236	A-7 S
IC240	L-9 S
IC241	A-7 S
IC242	M-9
IC243	M-9 S
IC244	L-9
IC301	D-5 S
IC302	D-5 S
IC303	B-5 S
IC305	D-4
IC306	E-5
IC402	C-4
IC403	B-4
IC404	D-3
IC405	D-3 S
IC407	D-4
IC410	B-3 S
IC411	G-2 S
IC412	H-2
IC901	K-1 S
IC902	L-2 S
IC903	L-2 S
IC904	M-2 S
IC905	L-3 S
IC906	J-6 S
IC907	K-2 S
IC910	L-4 S
IC911	M-3 S
IC912	L-5 S
IC930	J-4 S
L101	H-5
L103	H-5
L104	H-7
L201	G-7
L202	E-6
L203	J-7
L204	J-7
L205	G-7
L206	C-6
L207	J-8
L208	L-8
L209	L-6
L210	C-8
L211	F-10
L212	E-9
L213	E-8
L214	H-8
L215	F-8
L301	D-5
L302	D-5
L303	C-5
L304	C-5
L305	B-4
L306	B-5
L307	A-4
L308	A-5
L402	D-4
L403	F-1
L404	H-1
L405	D-2
L410	I-3
L411	I-2
L901	I-4
L902	L-2
L903	I-1
L904	K-1
L905	K-1
L906	M-2
L907	J-5
L908	J-4
L909	K-2
L910	K-4
L911	J-3
L913	K-4
L914	M-2
L915	L-5
L921	J-4
Q101	G-4
Q102	H-4
Q103	F-4
Q104	G-4
Q105	E-4
Q106	E-4
Q107	F-5
Q108	F-4
Q109	G-4
Q110	F-4
Q301	D-5
Q302	B-5
Q303	B-5
Q401	A-3
Q402	A-4
Q403	B-3
Q404	B-4
Q405	B-3
Q406	B-2
Q407	B-2
Q408	B-2
Q409	B-2
Q410	A-3
Q411	A-2
Q412	B-2
Q413	B-2
Q414	A-2
Q415	C-3
Q416	C-2
Q417	C-2
Q418	C-2
Q419	C-2
Q421	D-3
Q422	D-3
Q423	D-4
Q424	C-4
Q425	A-3
Q427	D-1
Q428	D-3
Q429	D-3
Q430	E-2
Q431	E-2
Q432	E-1
Q433	E-1
Q434	E-1
Q435	D-2
Q436	D-2
Q437	D-2
Q438	E-2
Q455	H-2
Q456	H-2
Q457	H-2
Q458	F-1
Q459	F-1
Q460	F-1
Q461	C-3
Q462	B-4
Q463	D-4
Q465	D-4
Q466	H-2
Q470	G-3
Q471	G-3
Q472	G-3
Q473	F-3
Q474	F-3
Q475	F-3
Q476	G-4
Q477	G-4
Q478	F-4
Q479	F-4
Q480	F-4
Q481	E-4
Q482	F-2
Q483	F-3
Q484	H-2
Q485	H-2
Q486	H-3
Q487	E-3
Q488	E-3
Q489	F-3
Q901	J-1
Q902	J-2
Q903	J-2
Q904	K-2
Q905	L-2
RV101	G-4
RV102	F-5
RV103	E-5
RV202	B-8
RV203	J-7
RV401	A-4
RV402	C-4
RV403	B-4
RV404	B-4
RV405	B-2
RV406	B-2
RV407	C-2
RV408	D-4
RV409	D-3
RV410	D-1
RV412	E-2
RV416	F-2
RV419	B-4
RV420	A-4
RV421	D-2
RV423	G-2
RV430	H-3
RV431	G-3
RV432	G-4
RV433	F-4
RV435	H-4
RV436	F-4
RV438	E-4
RV440	F-2
RV441	E-3
RV442	F-3
RV443	G-3
RV444	H-3
RV901	L-3
TP101	G-5
TP102	G-5
TP103	E-5
TP104	F-5
TP201	I-7
TP202	J-10
TP203	J-10
TP205	K-9
TP206	L-8
TP207	L-8
TP301	C-5
TP302	C-5
TP303	A-5
TP401	A-1
TP402	B-3
TP403	B-1
TP404	B-3
TP405	C-1
TP406	C-3
TP407	C-1
TP409	E-1
TP410	D-2
TP411	F-1
TP413	G-1
TP414	G-1
TP420	E-3
TP421	E-3
TP422	E-4
TP423	E-4
TP425	F-3
TP426	F-3
TP427	H-3
TP901	M-2
TP902	L-2
TP903	K-2
TP904	J-4
TP905	K-2
TP906	L-3
TP907	J-4
TP911	J-4
X901	K-4
X902	K-3

FM-30 (FRAME MEMORY)



- ▨ : Soldering side
- ▨ : Component side

FRAME MEMORY **FM-30** FRAME MEMORY **FM-30**


C
B
A
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IC403
IC410
IC302
IC303
IC241
IC236
IC228
IC229
IC224
IC232
IC226
IC225
1
2
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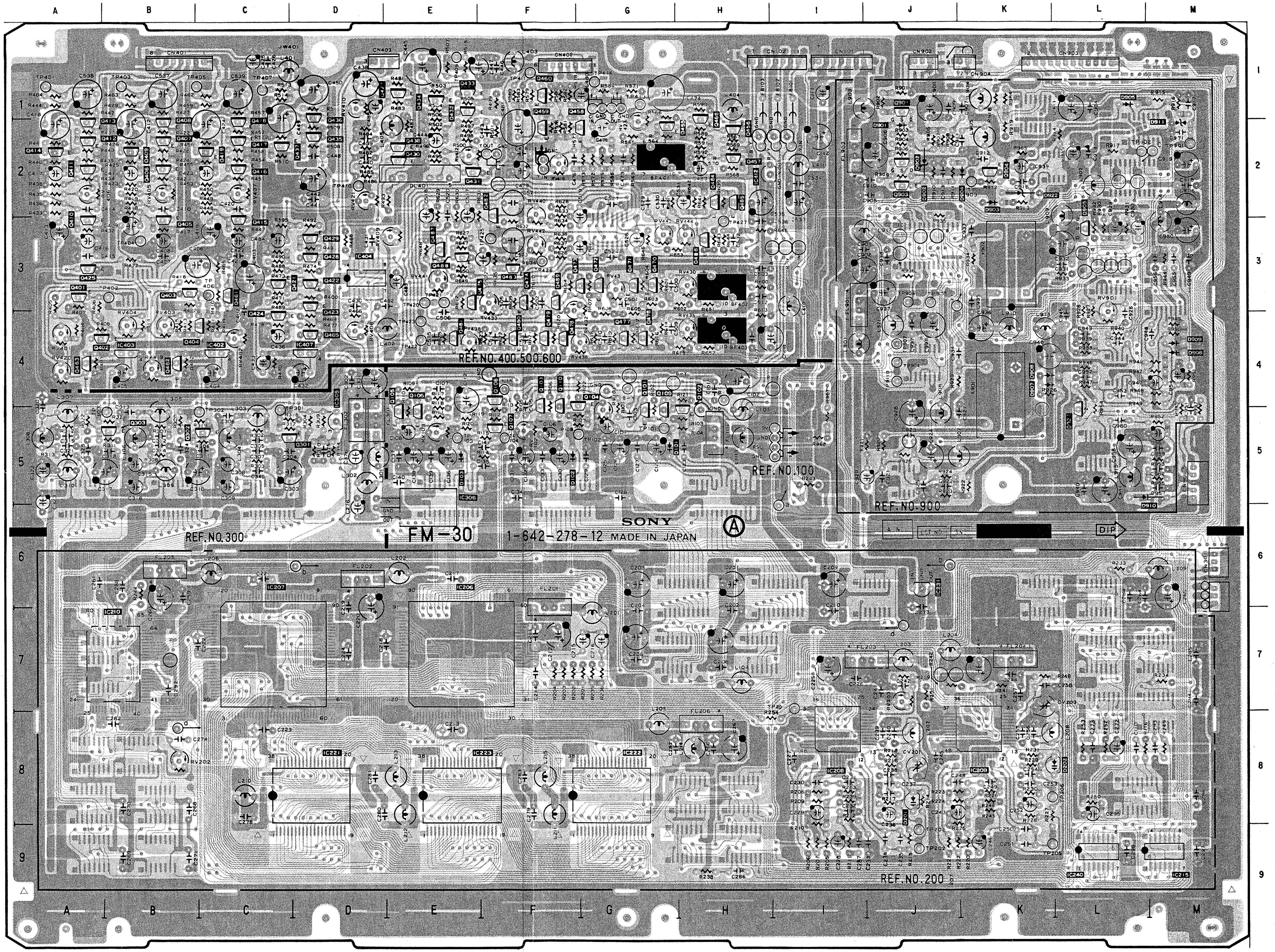
9

FM-30 —SOLDERING SIDE—
1-642-278-12


A
B
C
D
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F
G
H
I
J
K
L
M
REF.NO.400.500.600
REF.NO.300
REF.NO.100
REF.NO.900
REF.NO.200
SONY
FM-30
1-642-278-12 MADE IN JAPAN
Ⓐ
DIP
CN401
CN403
CN402
CN102
CN101
CN902
CN903
IC206
IC207
IC210
IC221
IC223
IC222
IC208
IC209
IC240
IC215
1
2
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4
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6
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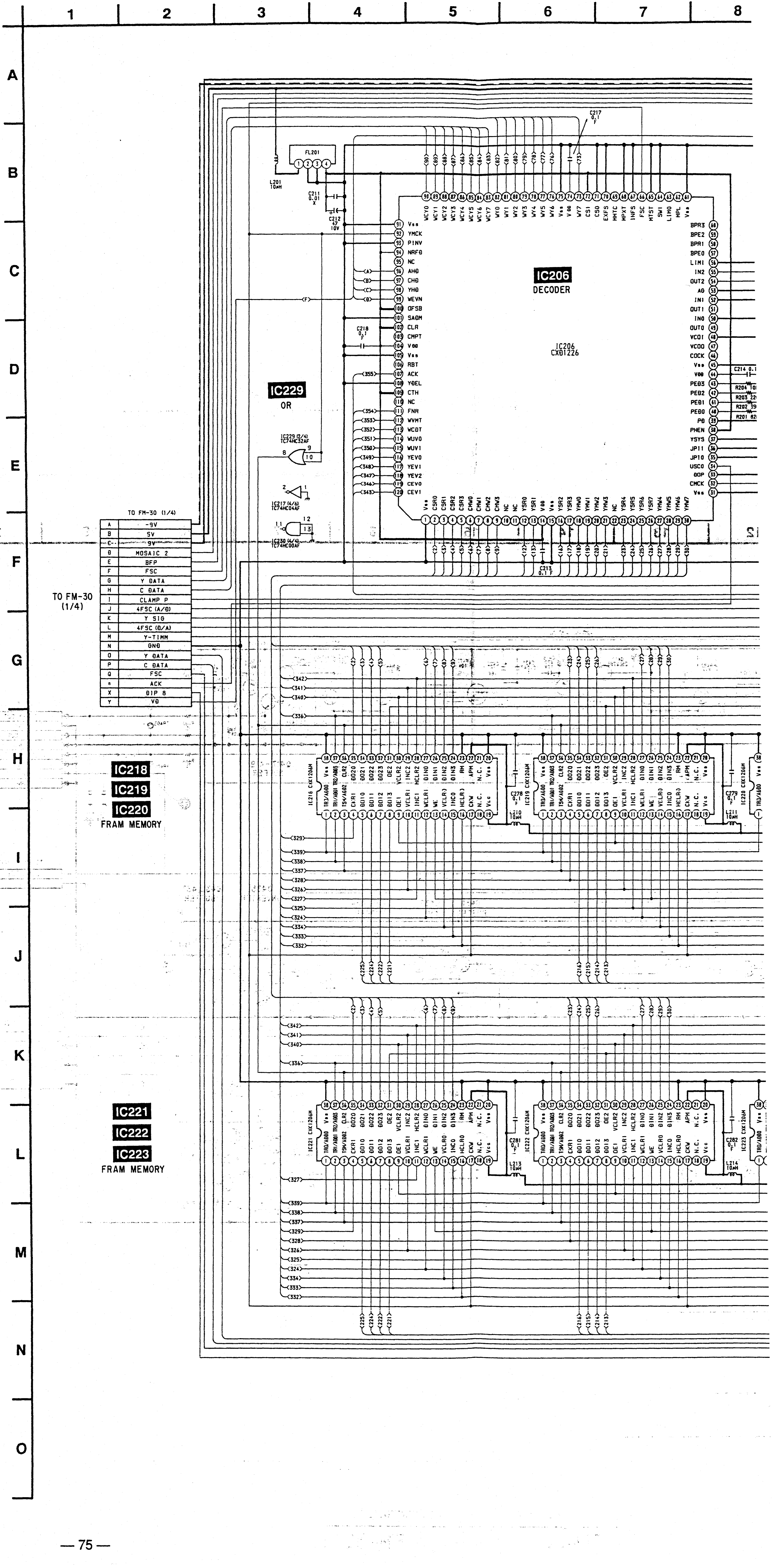
8
9

FM-30 —COMPONENT SIDE—
1-642-278-12

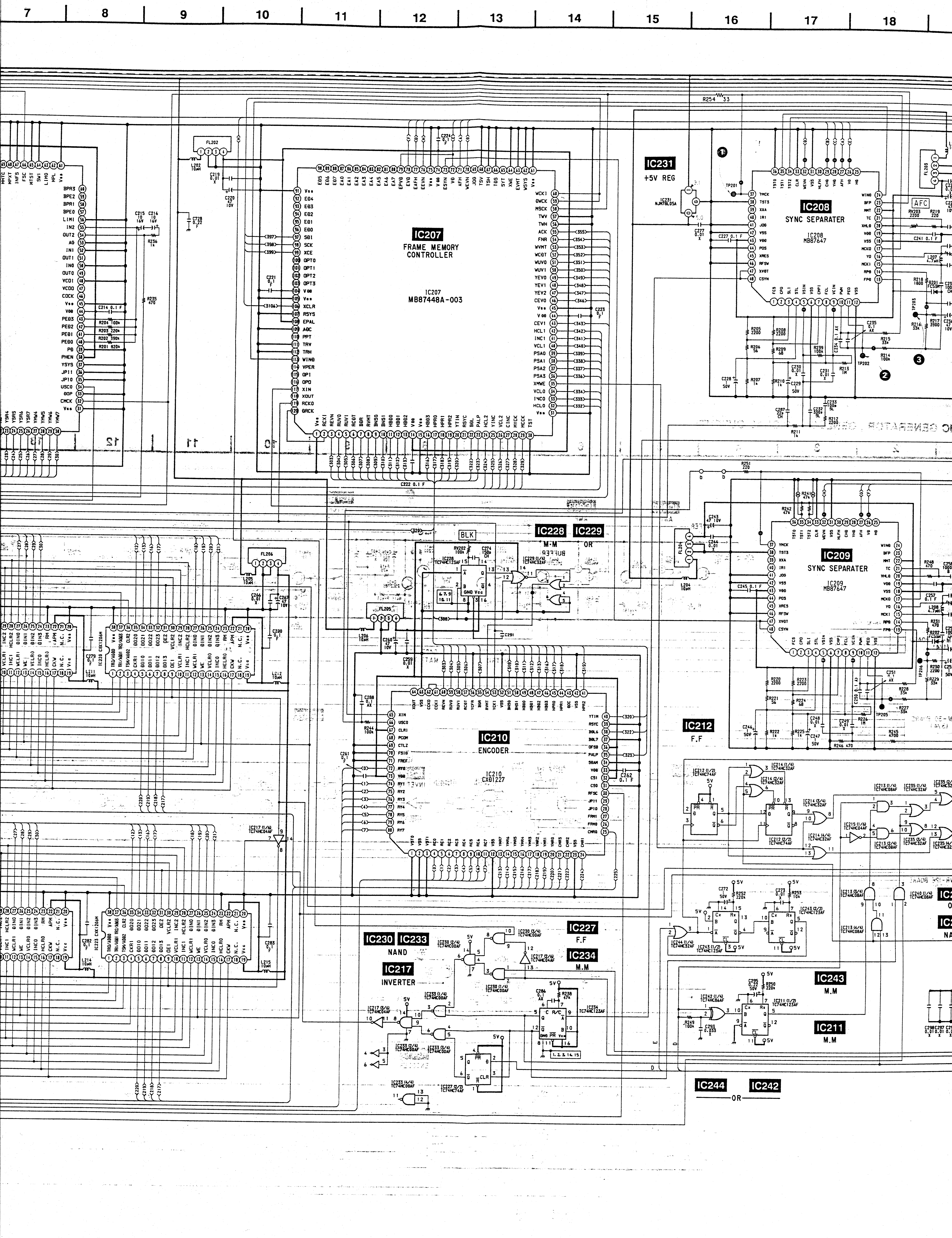
FRAME MEMORY FRAME MEMORY

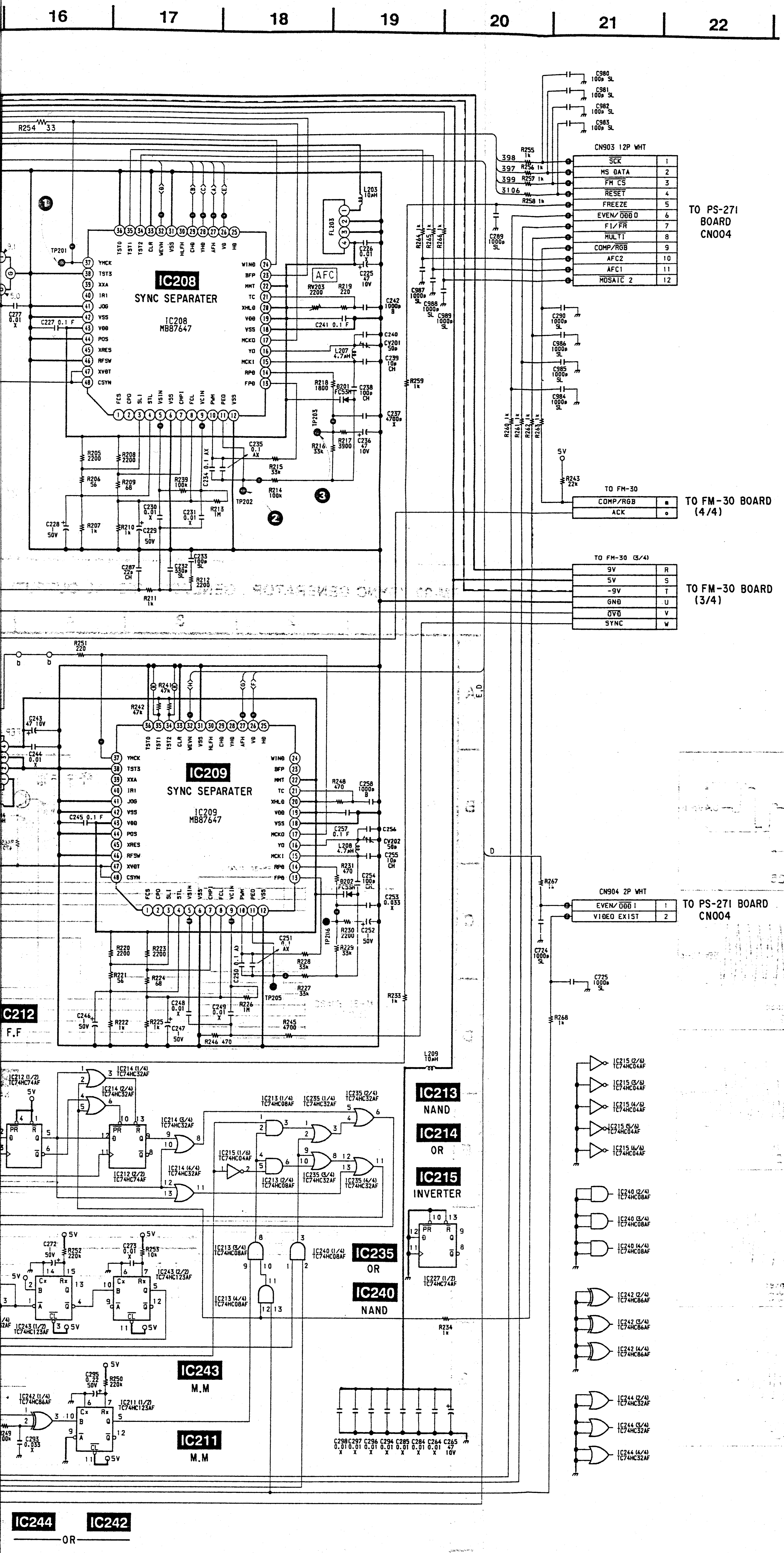
FM-30 **FM-30**

FM-30 (FRAME MEMORY)


1
2
3
4
5
6
7
8
A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
IC206
DECODER
IC206
CXD1226
FL201
L201
10μH
C211
0.01
C212
47
10V
C217
0.1
F
C218
0.1
F
C213
0.1 F
C214 0.1
R204
R203
R202
R201
IC229
OR
IC229 (3/4)
TC74HC32AF
IC217 (4/6)
TC74HC04AF
IC230 (4/4)
TC74HC00AF
TO FM-30 (1/4)
TO FM-30
(1/4)
A -9V
B 5V
C 9V
D MOSAIC 2
E BFP
F FSC
G Y DATA
H C DATA
I CLAMP P
J 4FSC (A/D)
K Y SIG
L 4FSC (D/A)
M Y-TIMM
N GND
O Y DATA
P C DATA
Q FSC
ACK
X DIP 8
Y VD
IC218
IC219
IC220
FRAM MEMORY
IC218 CXK1206M
IC219 CXK1206M
IC220 CXK1206M
C278
0.1
L210
10μH
C279
0.1
L211
10μH
IC221
IC222
IC223
FRAM MEMORY
IC221 CXK1206M
IC222 CXK1206M
IC223 CXK1206M
C281
0.1
L213
10μH
C282
0.1
L214
10μH

Son/SP0275

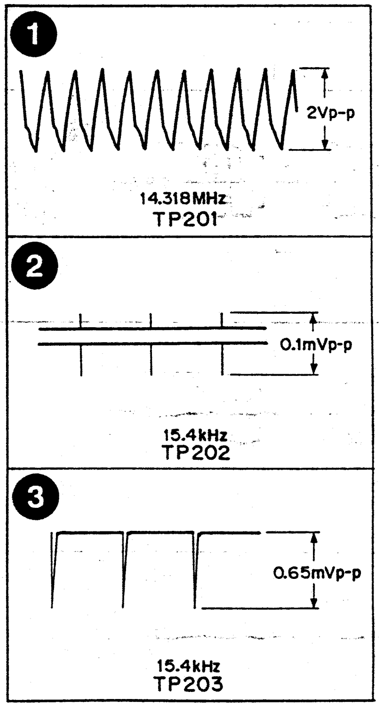

7
8
9
10
11
12
13
14
15
16
17
18
IC207
FRAME MEMORY CONTROLLER
IC207 MB87448A-003
IC231
+5V REG
IC231 NJM78L05A
IC208
SYNC SEPARATER
IC208 MB87647
AFC
IC209
SYNC SEPARATER
IC209 MB87647
IC228
IC229
M-M
OR
BUFFER
BLK
IC210
ENCODER
IC210 CXD1227
IC212
F.F
IC230
IC233
NAND
IC217
INVERTER
IC227
F.F
IC234
M.M
IC243
M.M
IC211
M.M
IC244
IC242
OR
FL202
FL205
FL206
FL204
FL203
R254 33
TP201
TP202
TP203
TP205
C222 0.1 F
C227 0.1 F
C245 0.1 F
C241 0.1 F
IC220 CXK1206M
IC223 CXK1206M


16
17
18
19
20
21
22
IC208
SYNC SEPARATER
IC208
MB87647
AFC
TP201
TP202
TP205
CN903 12P WHT
SCK
MS DATA
FM CS
RESET
FREEZE
EVEN/ODD
F1/FR
MULTI
COMP/RGB
AFC2
AFC1
MOSAIC 2
TO PS-271 BOARD CN004
TO FM-30
COMP/RGB
ACK
TO FM-30 BOARD (4/4)
TO FM-30 (3/4)
9V
5V
-9V
GND
ODD
SYNC
TO FM-30 BOARD (3/4)
IC209
SYNC SEPARATER
IC209
MB87647
CN904 2P WHT
EVEN/ODD I
VIDEO EXIST
TO PS-271 BOARD CN004
IC212
F.F
IC213
NAND
IC214
OR
IC215
INVERTER
IC235
OR
IC240
NAND
IC243
M.M
IC211
M.M
IC244
IC242
OR

- **For schematic diagrams.**
- Caution when replacing chip parts.
  New parts must be attached after removal of chip.
  Be careful not to heat the minuts side of tantalum capacitor, because it is damaged by the heat.
- All resistors are in ohms, 1/4W unless otherwise noted.
  Chip resistor are 1/10W unless otherwise noted.
  kΩ : 1000Ω , MΩ : 1000kΩ .
- All capacitors are in μF unless otherwise noted. pF: μμF.
  50V or less are not indicated except for electrolytics and tantalums.
- All variable and adjustable resistors have characteristic curve B, unless otherwise noted.
- ☐ : panel designation.
- ☐ : adjustment for repeair.
- ━ : B+ Line.
- Circled numbers refer to waveforms.
- Voltages are dc between ground and measurement points.
- Readings are taken with a color-bar signal input.
- Readings are taken with a digital multimeter (DC10MΩ).
- Voltages are taken with a VOM (Input impedance 10MΩ).
- Voltage variations may be noted due to normal production tolerances.
- ✳: Impossible to measure the voltage at the marked points.
- SWITCH POSITION

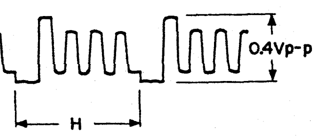
PICTURE EFFECT	OFF
MEMORY	FRAME
COLOR VIDEO SET UP	CLICK

FM-30

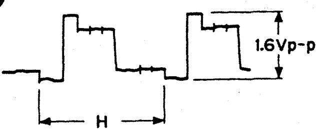


- **For schematic diagrams.**
- Caution when replacing chip parts.
  New parts must be attached after removal of chip.
  Be careful not to heat the minuts side of tantalum capacitor, because it is damaged by the heat.
- All resistors are in ohms, 1/4W unless otherwise noted.
  Chip resistor are 1/10W unless otherwise noted.
  kΩ : 1000Ω , MΩ : 1000kΩ .
- All capacitors are in μF unless otherwise noted. pF: μμF.
  50V or less are not indicated except for electrolytics and tantalums.
- All variable and adjustable resistors have characteristic curve B, unless otherwise noted.
- ▭ : panel designation.
- ▭ : adjustment for repeair.
- —— : B+ Line.
- Circled numbers refer to waveforms.
- Voltages are dc between ground and measurement points.
- Readings are taken with a color-bar signal input.
- Readings are taken with a digital multimeter (DC10MΩ).
- Voltages are taken with a VOM (Input impedance 10MΩ).
- Voltage variations may be noted due to normal production tolerances.
- ⁎: Impossible to measure the voltage at the marked points.
- SWITCH POSITION
  PICTURE EFFECT OFF
  MEMORY FRAME
  COLOR, VIDEO, SET UP } CLICK

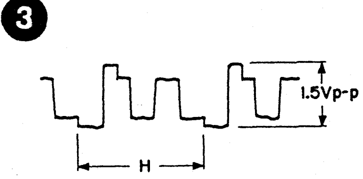
FM-30

①


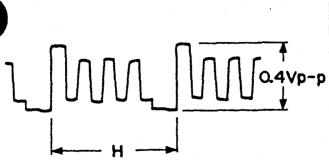
TP401

②


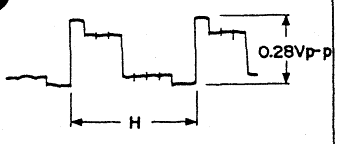
TP403

③


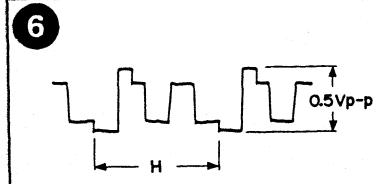
TP405

④


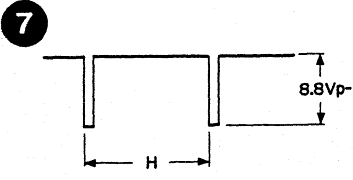
TP402

⑤


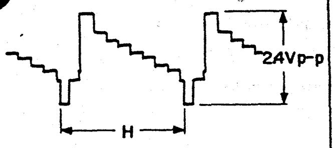
TP404

⑥


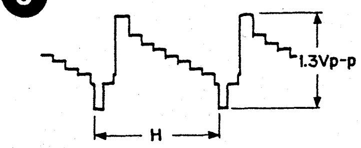
TP406

⑦


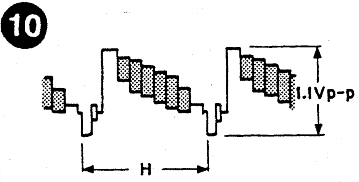
TP407

⑧


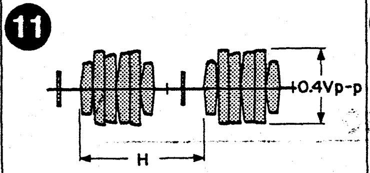
TP409

⑨


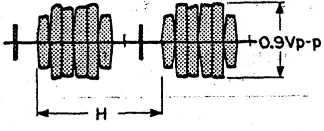
TP410

⑩


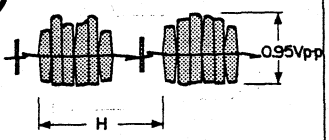
TP411

⑪


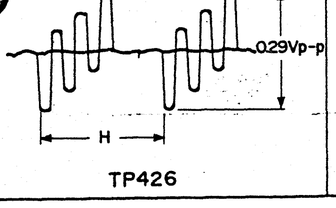
TP413

⑫


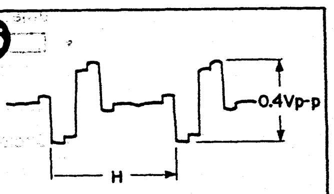
TP414

⑬


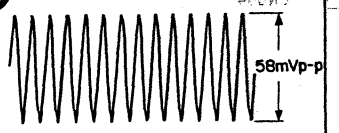
TP427

⑭


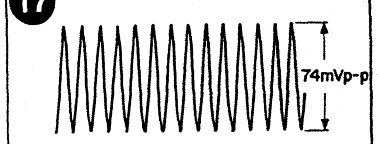
TP426

⑮


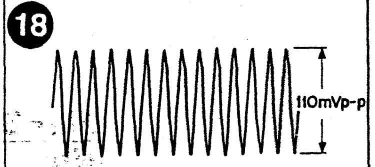
TP425

⑯


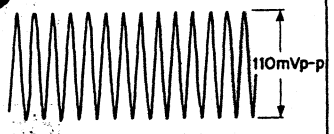
0.225nsec
TP420

⑰


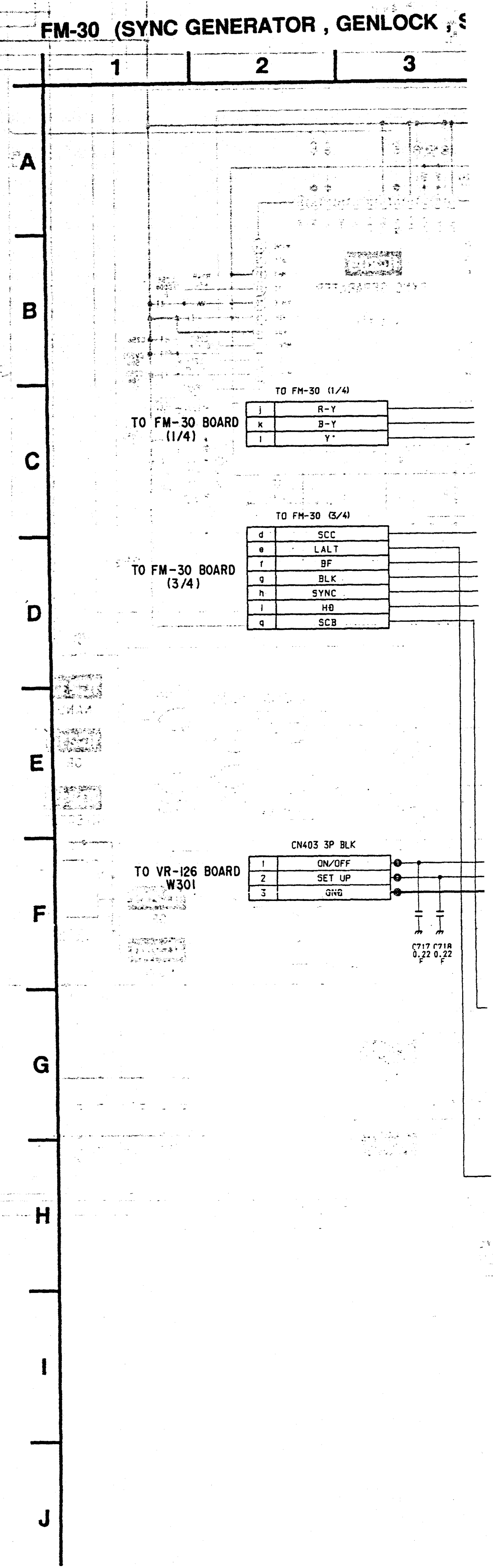
0.225nsec
TP421

⑱


0.225nsec
TP422

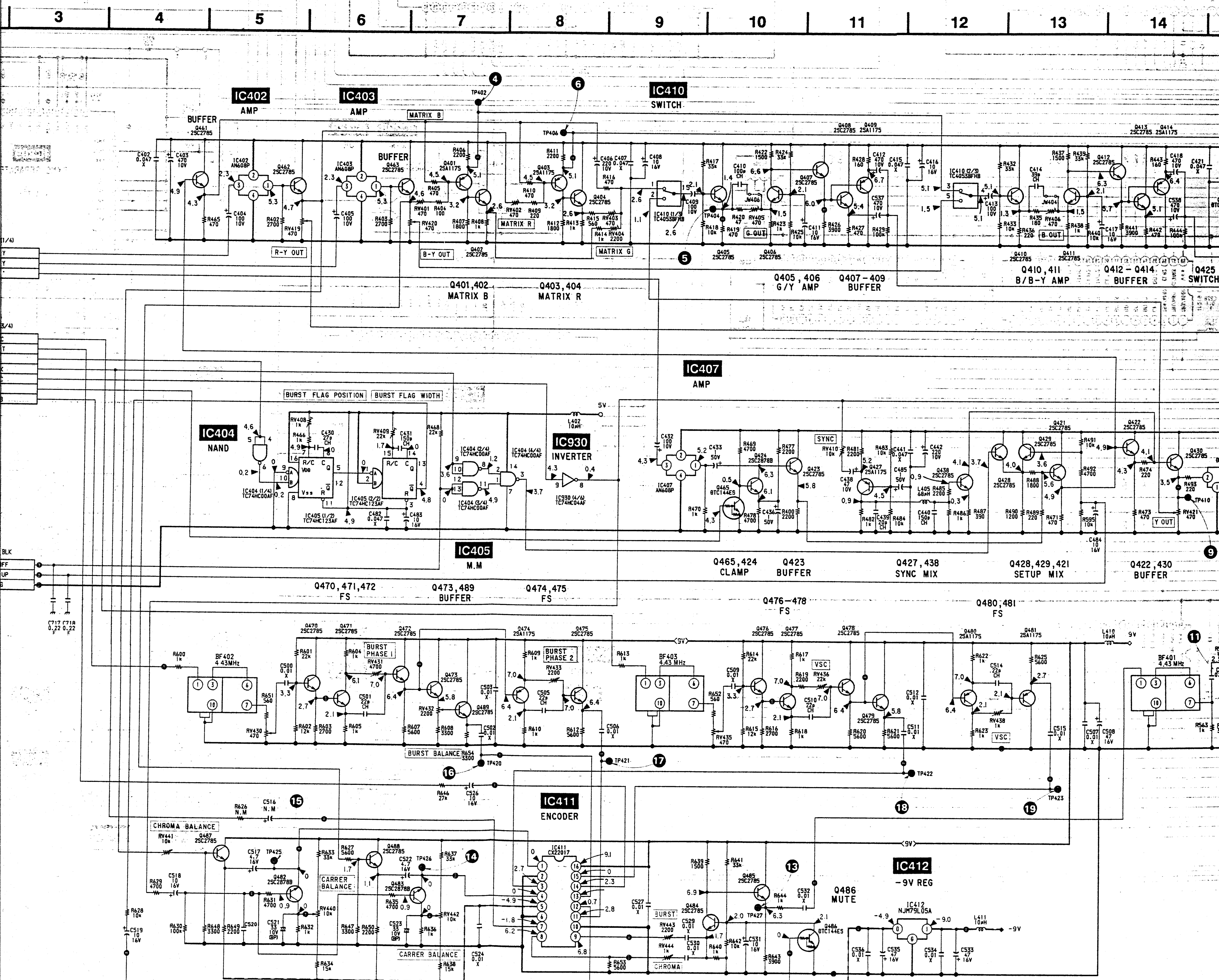
⑲


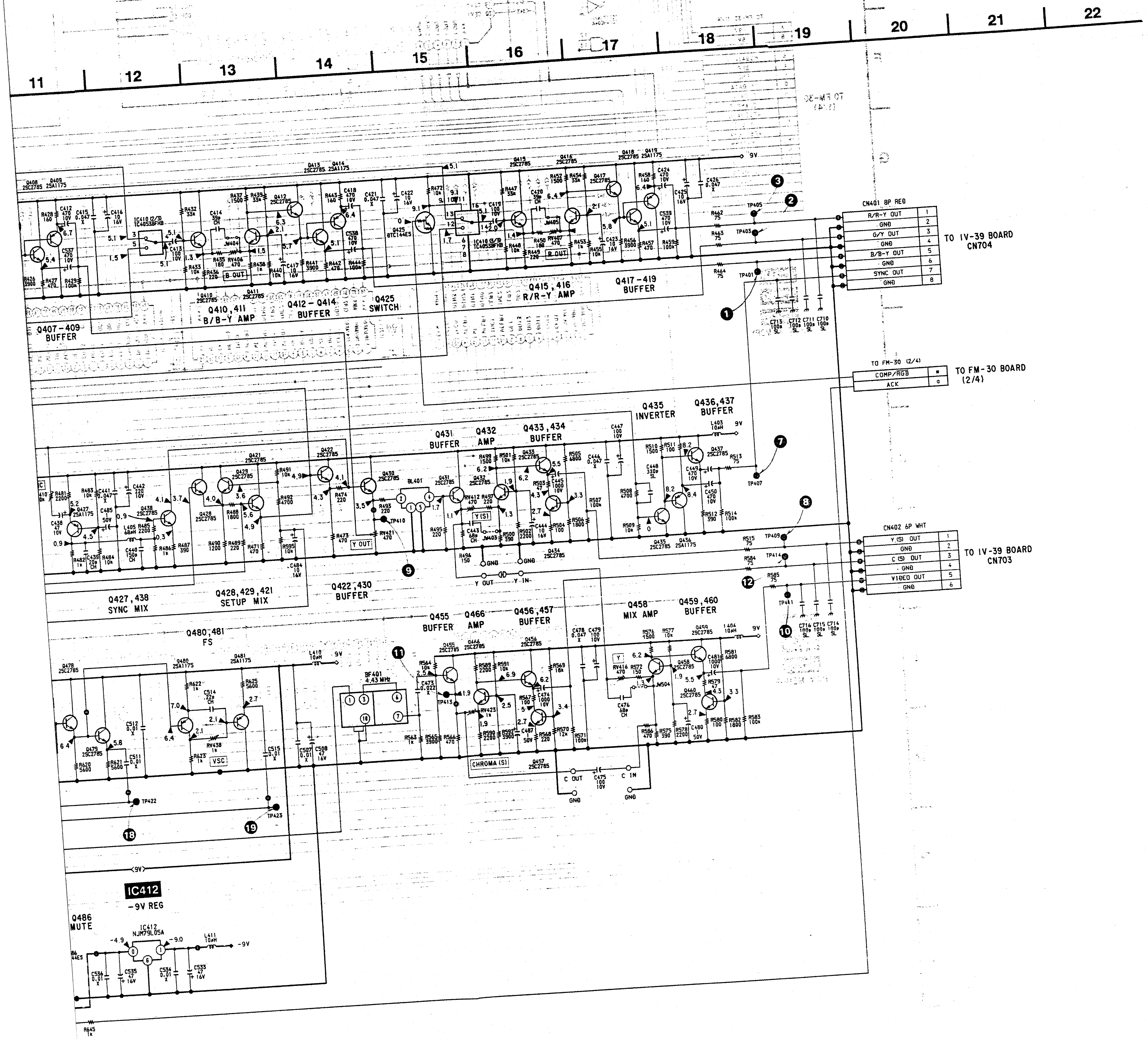
0.225nsec
TP423


FM-30 (SYNC GENERATOR , GENLOCK , S
1
2
3
A
B
C
D
E
F
G
H
I
J
TO FM-30 (1/4)
TO FM-30 BOARD (1/4)
j R-Y
k B-Y
l Y'
TO FM-30 (3/4)
TO FM-30 BOARD (3/4)
d SCC
e LALT
f BF
g BLK
h SYNC
i HD
q SCB
CN403 3P BLK
TO VR-126 BOARD W301
1 ON/OFF
2 SET UP
3 GND
C717 0.22 F
C718 0.22 F

SYNC GENERATOR (1) FM-30 | SYNC GENERATOR (1) FM-30

, GENLOCK , SIGNAL OUTPUT)


3
4
5
6
7
8
9
10
11
12
13
14
IC402 AMP
IC403 AMP
IC410 SWITCH
BUFFER
MATRIX B
MATRIX R
MATRIX G
R-Y OUT
B-Y OUT
G OUT
B OUT
Q401,402 MATRIX B
Q403,404 MATRIX R
Q405,406 G/Y AMP
Q407-409 BUFFER
Q410,411 B/B-Y AMP
Q412-Q414 BUFFER
Q425 SWITCH
IC407 AMP
IC404 NAND
BURST FLAG POSITION
BURST FLAG WIDTH
IC930 INVERTER
IC405 M.M
SYNC
Y OUT
Q465,424 CLAMP
Q423 BUFFER
Q427,438 SYNC MIX
Q428,429,421 SETUP MIX
Q422,430 BUFFER
Q470,471,472 FS
Q473,489 BUFFER
Q474,475 FS
Q476-478 FS
Q480,481 FS
BF402 4.43MHz
BF403 4.43MHz
BF401 4.43MHz
BURST PHASE 1
BURST PHASE 2
BURST BALANCE
VSC
TP420
TP421
TP422
TP423
IC411 ENCODER
CX22017
CHROMA BALANCE
CARRER BALANCE
IC412 -9V REG
NJM79L05A
Q486 MUTE
BURST
CHROMA
Q487 BUFFER
Q482 CLAMP
Q488 BUFFER
Q483 CLAMP
Q484,485 MIX AMP


11
12
13
14
15
16
17
18
19
20
21
22
Q407-409
BUFFER
Q410,411
B/B-Y AMP
Q412-Q414
BUFFER
Q425
SWITCH
Q415,416
R/R-Y AMP
Q417-419
BUFFER
IC410 (2/3)
TC4053BFKB
IC410 (3/3)
TC4053BFKB
B OUT
R OUT
9V
TP405
TP403
TP401
CN401 8P RED
R/R-Y OUT
GND
G/Y OUT
GND
B/B-Y OUT
GND
SYNC OUT
GND
TO IV-39 BOARD
CN704
C713 100p SL
C712 100p SL
C711 100p SL
C710 100p SL
TO FM-30 (2/4)
COMP/RGB
ACK
TO FM-30 BOARD
(2/4)
Q435
INVERTER
Q436,437
BUFFER
Q431
BUFFER
Q432
AMP
Q433,434
BUFFER
BL401
Y (S)
Y OUT
TP410
TP407
TP409
TP414
TP411
R513 75
R515 75
R584 75
R585 75
CN402 6P WHT
Y (S) OUT
GND
C (S) OUT
GND
VIDEO OUT
GND
TO IV-39 BOARD
CN703
C716 100p SL
C715 100p SL
C714 100p SL
Q427,438
SYNC MIX
Q428,429,421
SETUP MIX
Q422,430
BUFFER
Y OUT
Y IN
GND
Q480,481
FS
Q455
BUFFER
Q466
AMP
Q456,457
BUFFER
Q458
MIX AMP
Q459,460
BUFFER
BF401
4.43 MHz
TP415
CHROMA (S)
Y
C OUT
C IN
VSC
TP422
TP423
<9V>
IC412
-9V REG
Q486
MUTE
IC412
NJM79L05A
L411 10μH
-9V
R645 1k
1
2
3
7
8
9
10
11
12
18
19

SYNC GENERATOR (1)

FM-30

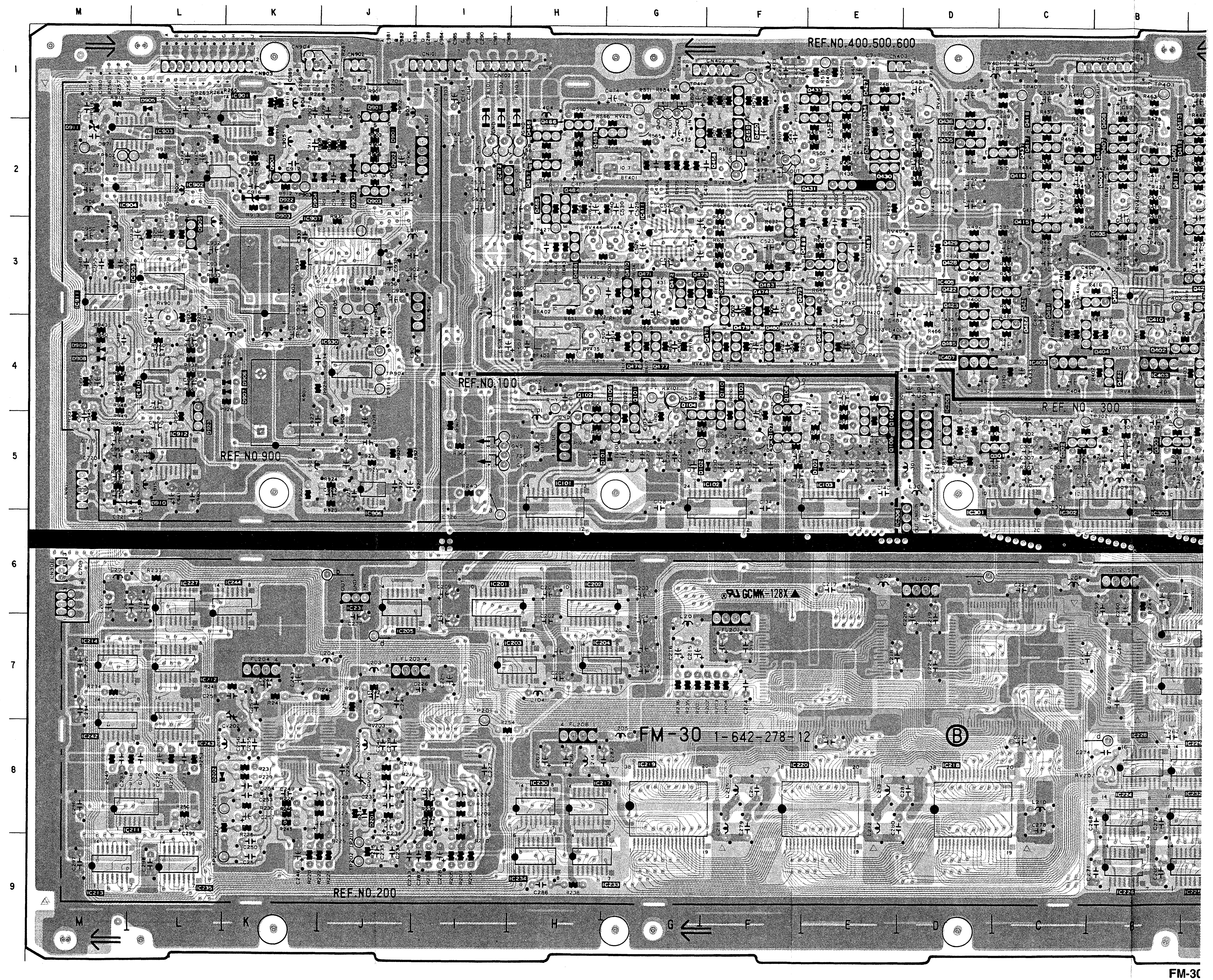
SYNC GENERATOR (1)

FM-30

FM-30 Board

FM-30 (SYNC GENERATOR , GENLOCK , SIGNAL OUTPUT)

BF401	G-2	
BF402	H-2	
BF403	H-4	
CN101	I-1	
CN102	I-1	
CN301	M-6	
CN401	B-1	
CN402	F-1	
CN403	D-1	
CN901	M-5	
CN902	J-1	
CN903	L-1	
CN904	K-1	
CV201	J-8	
CV202	L-7	
D101	G-5	
D102	F-5	
D103	E-5	
D201	J-8	
D202	L-8	
D901	J-1	
D902	J-1	
D903	K-2	
D904	J-1	
D905	L-1	
D906	K-4	
D907	K-4	
D908	M-4	
D909	M-4	
D911	M-8	
D922	K-2	
D923	L-5	
DL401	E-2	
FL101	H-5	
FL201	F-6	
FL202	D-6	
FL203	I-7	
FL204	K-7	
FL205	B-6	
FL206	H-8	
FL301	E-5	
FL302	D-5	
FL901	I-3	
FL902	I-2	
IC101	H-5	S
IC102	F-5	S
IC103	E-5	S
IC201	I-6	
IC202	H-6	S
IC203	H-7	S
IC204	H-7	S
IC205	J-6	S
IC206	E-6	
IC207	C-6	
IC208	I-8	
IC209	K-8	
IC210	B-7	
IC211	L-8	S
IC212	M-7	S
IC213	M-7	S
IC214	L-7	S
IC215	L-7	S
IC217	H-8	S
IC218	D-8	S
IC219	G-8	S
IC220	E-8	S
IC221	D-8	
IC222	G-8	
IC223	F-8	
IC224	B-8	S
IC225	A-9	S
IC226	B-9	S
IC227	L-6	S
IC228	B-8	S
IC229	A-8	S
IC230	H-8	S
IC231	J-6	S
IC232	A-8	S
IC233	H-8	S
IC234	H-9	S
IC235	K-6	
IC236	A-7	S
IC240	L-9	S
IC241	A-7	S
IC242	M-9	
IC243	M-9	S
IC244	L-9	
IC301	D-5	S
IC302	D-5	S
IC303	B-5	S
IC305	D-4	
IC306	E-5	
IC402	C-4	
IC403	B-4	
IC404	D-3	
IC405	D-3	S
IC407	D-4	
IC410	B-3	S
IC411	G-2	S
IC412	H-2	
IC901	K-1	S
IC902	L-2	S
IC903	L-2	S
IC904	M-2	S
IC905	L-3	S
IC906	J-6	S
IC907	K-2	S
IC910	L-4	S
IC911	M-3	S
IC912	L-5	S
IC930	J-4	S
L101	H-5	
L103	H-5	
L104	H-7	
L201	G-7	
L202	E-6	
L203	J-7	
L204	J-7	
L205	G-7	
L206	C-6	
L207	J-8	
L208	L-8	
L209	L-6	
L210	C-8	
L211	F-10	
L212	E-9	
L213	E-8	
L214	H-8	
L215	F-8	
L301	D-5	
L302	D-5	
L303	C-5	
L304	C-5	
L305	B-4	
L306	B-5	
L307	A-4	
L308	A-5	
L402	D-4	
L403	F-1	
L404	H-1	
L405	D-2	
L410	I-3	
L411	I-2	
L901	I-4	
L902	L-2	
L903	I-1	
L904	K-1	
L905	K-1	
L906	M-2	
L907	J-5	
L908	J-4	
L909	K-2	
L910	K-4	
L911	J-3	
L913	K-4	
L914	M-2	
L915	L-5	
L921	J-4	
Q101	G-4	
Q102	H-4	
Q103	F-4	
Q104	G-4	
Q105	E-4	
Q106	E-4	
Q107	F-5	
Q108	F-4	
Q109	G-4	
Q110	F-4	
Q301	D-5	
Q302	B-5	
Q303	B-5	
Q401	A-3	
Q402	A-4	
Q403	B-3	
Q404	B-4	
Q405	B-3	
Q406	B-2	
Q407	B-2	
Q408	B-2	
Q409	B-2	
Q410	A-3	
Q411	A-2	
Q412	B-2	
Q413	B-2	
Q414	A-2	
Q415	C-3	
Q416	C-2	
Q417	C-2	
Q418	C-2	
Q419	C-2	
Q421	D-3	
Q422	D-3	
Q423	D-4	
Q424	C-4	
Q425	A-3	
Q427	D-1	
Q428	D-3	
Q429	D-3	
Q430	E-2	
Q431	E-2	
Q432	E-1	
Q433	E-1	
Q434	E-1	
Q435	D-2	
Q436	D-2	
Q437	D-2	
Q438	E-2	
Q455	H-2	
Q456	H-2	
Q457	H-2	
Q458	F-1	
Q459	F-1	
Q460	F-1	
Q461	C-3	
Q462	B-4	
Q463	D-4	
Q465	D-4	
Q466	H-2	
Q470	G-3	
Q471	G-3	
Q472	G-3	
Q473	F-3	
Q474	F-3	
Q475	F-3	
Q476	G-4	
Q477	G-4	
Q478	F-4	
Q479	F-4	
Q480	F-4	
Q481	E-4	
Q482	F-2	
Q483	F-3	
Q484	H-2	
Q485	H-2	
Q486	H-3	
Q487	E-3	
Q488	E-3	
Q489	F-3	
Q901	J-1	
Q902	J-2	
Q903	J-2	
Q904	K-2	
Q905	L-2	
RV101	G-4	
RV102	F-5	
RV103	E-5	
RV202	B-8	
RV203	J-7	
RV401	A-4	
RV402	C-4	
RV403	B-4	
RV404	B-4	
RV405	B-2	
RV406	B-2	
RV407	C-2	
RV408	D-4	
RV409	D-3	
RV410	D-1	
RV412	E-2	
RV416	F-2	
RV419	B-4	
RV420	A-4	
RV421	D-2	
RV423	G-2	
RV430	H-3	
RV431	G-3	
RV432	G-4	
RV433	F-4	
RV435	H-4	
RV436	F-4	
RV438	E-4	
RV440	F-2	
RV441	E-3	
RV442	F-3	
RV443	G-3	
RV444	H-3	
RV901	L-3	
TP101	G-5	
TP102	G-5	
TP103	E-5	
TP104	F-5	
TP201	I-7	
TP202	J-10	
TP203	J-10	
TP205	K-9	
TP206	L-8	
TP207	L-8	
TP301	C-5	
TP302	C-5	
TP303	A-5	
TP401	A-1	
TP402	B-3	
TP403	B-1	
TP404	B-3	
TP405	C-1	
TP406	C-3	
TP407	C-1	
TP409	E-1	
TP410	D-2	
TP411	F-1	
TP413	G-1	
TP414	G-1	
TP420	E-3	
TP421	E-3	
TP422	E-4	
TP423	E-4	
TP425	F-3	
TP426	F-3	
TP427	H-3	
TP901	M-2	
TP902	L-2	
TP903	K-2	
TP904	J-4	
TP905	K-2	
TP906	L-3	
TP907	J-4	
TP911	J-4	
X901	K-4	
X902	K-3	



▨ : Soldering side

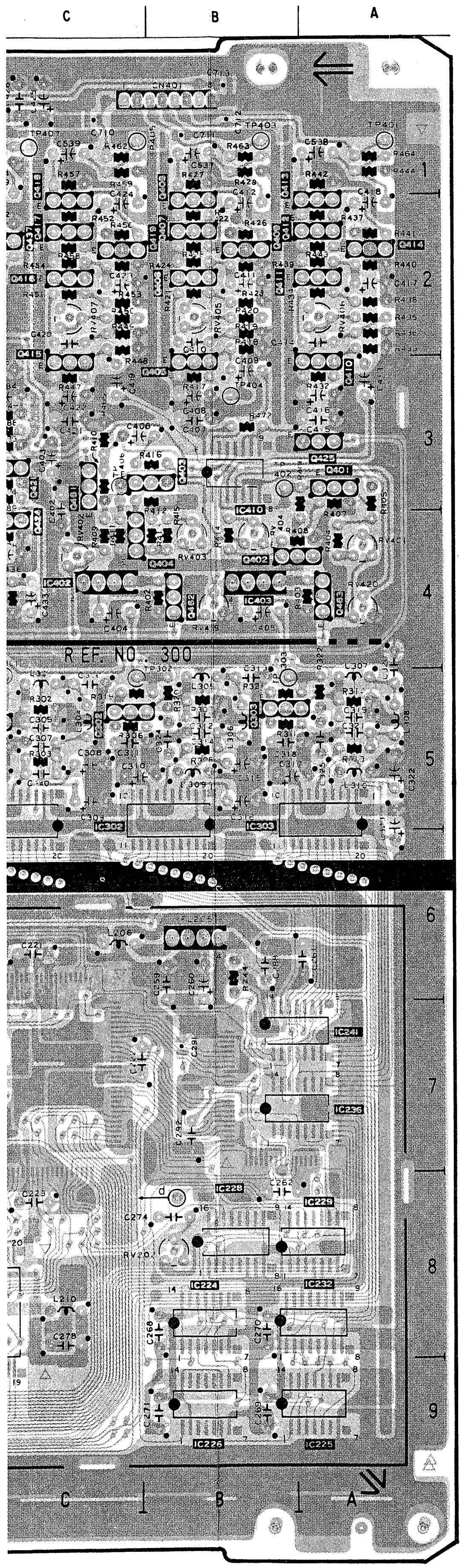
▨ : Component side

SYNC GENERATOR (1)

FM-30

SYNC GENERATOR (1)

FM-30


C
B
A
REF. NO. 300
1
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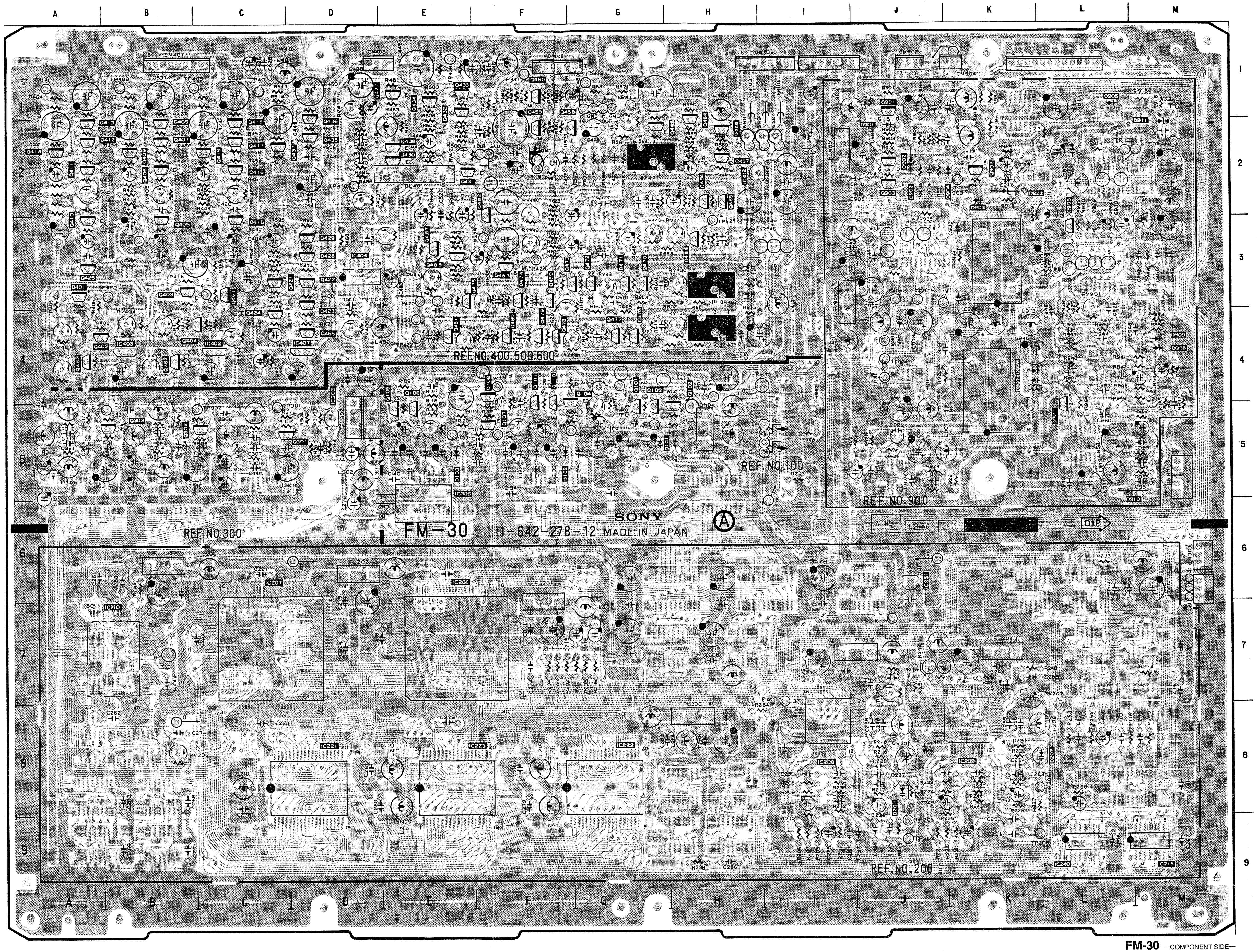
9

FM-30 —SOLDERING SIDE—
1-642-278-12


A
B
C
D
E
F
G
H
I
J
K
L
M
REF.NO.400.500.600
REF.NO.300
REF.NO.100
REF.NO.900
REF.NO.200
SONY
FM-30
1-642-278-12 MADE IN JAPAN
Ⓐ
DIP
1
2
3
4
5
6
7
8
9

FM-30 —COMPONENT SIDE—
1-642-278-12

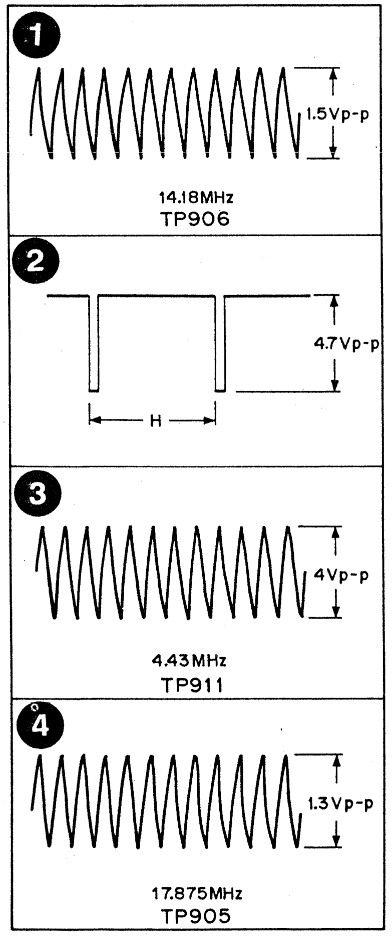
SYNC GENERATOR (1) SYNC GENERATOR (1)

FM-30 **FM-30**

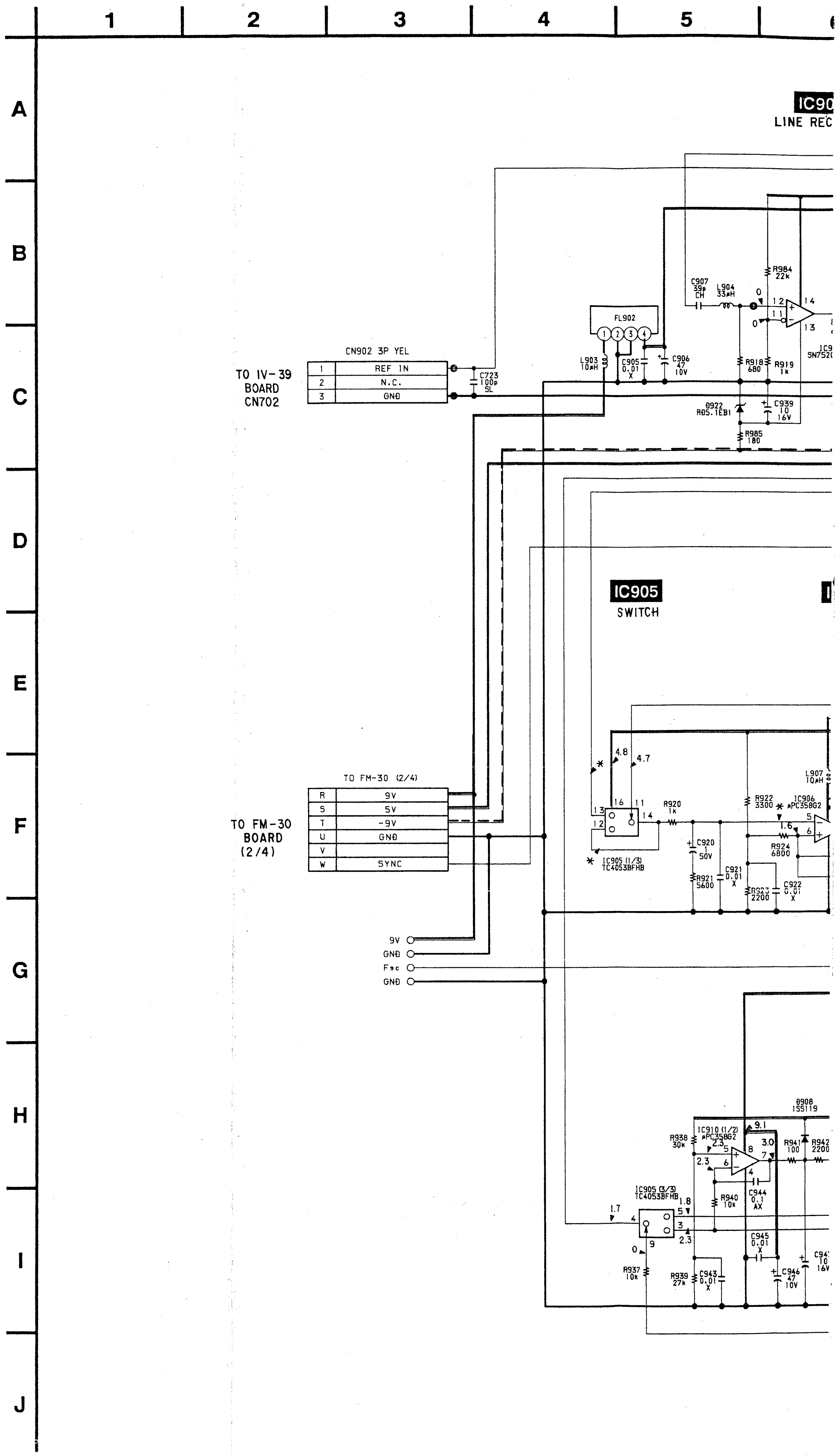
- **For schematic diagrams.**
- Caution when replacing chip parts.
  New parts must be attached after removal of chip.
  Be careful not to heat the minuts side of tantalum capacitor, because it is damaged by the heat.
- All resistors are in ohms, 1/4W unless otherwise noted.
  Chip resistor are 1/10W unless otherwise noted.
  kΩ : 1000Ω , MΩ : 1000kΩ .
- All capacitors are in μF unless otherwise noted. pF: μμF.
  50V or less are not indicated except for electrolytics and tantalums.
- All variable and adjustable resistors have characteristic curve B, unless otherwise noted.
- ☐ : panel designation.
- ☐ : adjustment for repair.
- —— : B+ Line.
- Circled numbers refer to waveforms.
- Voltages are dc between ground and measurement points.
- Readings are taken with a color-bar signal input.
- Readings are taken with a digital multimeter (DC10MΩ).
- Voltages are taken with a VOM (Input impedance 10MΩ).
- Voltage variations may be noted due to normal production tolerances.
- *: Impossible to measure the voltage at the marked points.
- SWITCH POSITION

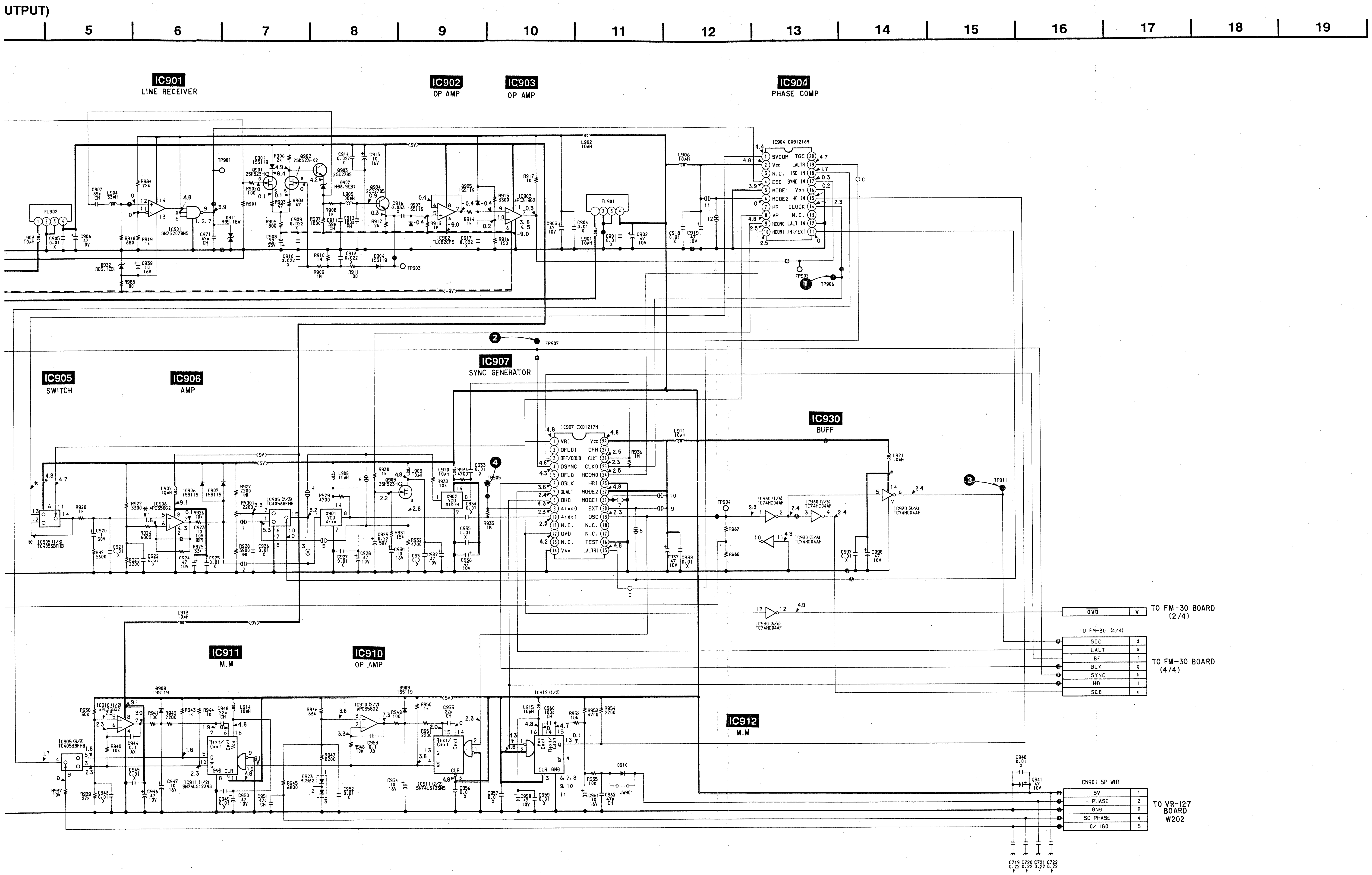
PICTURE EFFECT	OFF
MEMORY	FRAME
COLOR VIDEO SET UP	CLICK

FM-30



FM-30 (SYNC GENERATOR , GENLOCK , SIGNAL OUTPUT)

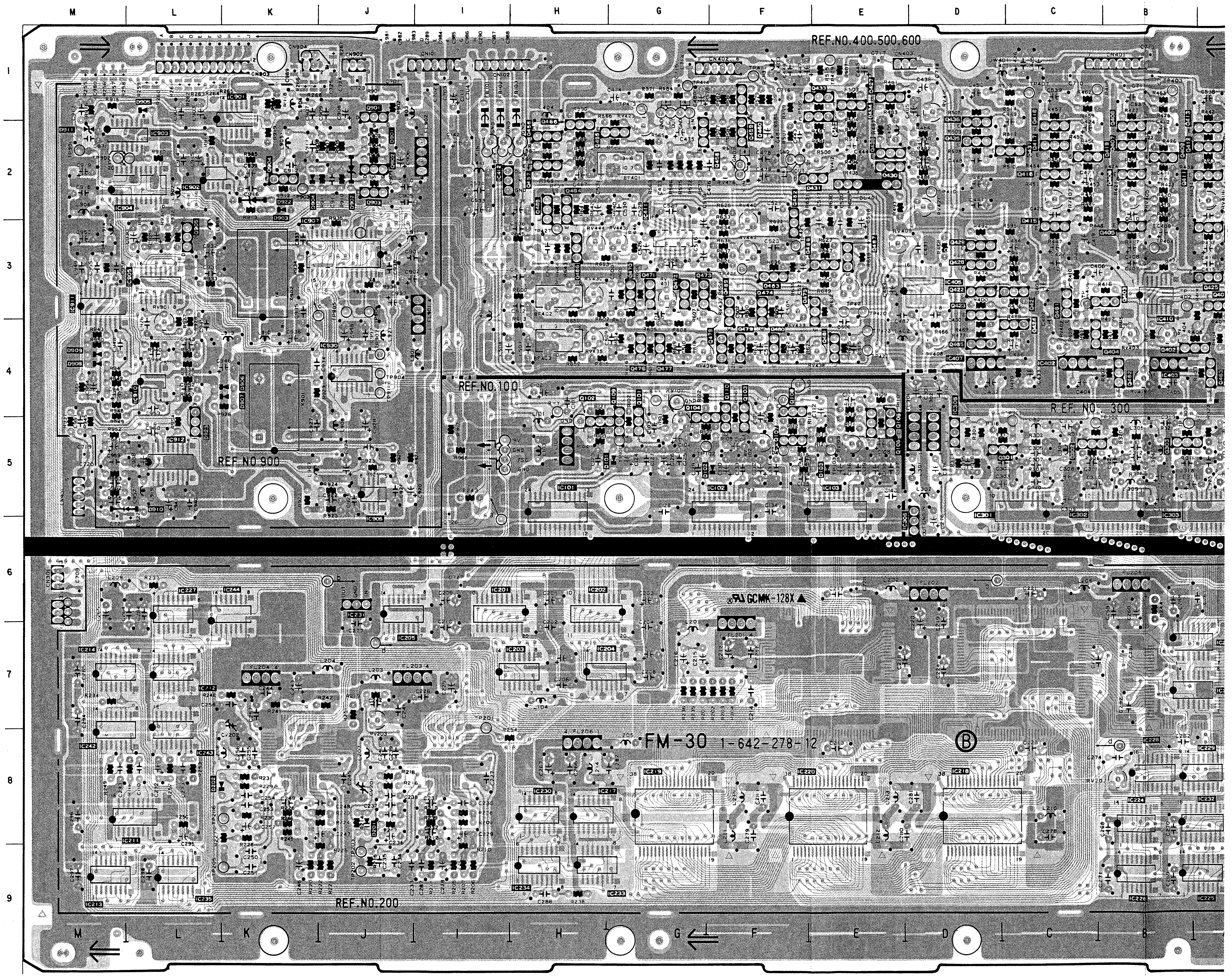

1
2
3
4
5
A
B
C
D
E
F
G
H
I
J
IC90
LINE REC
FL902
CN902 3P YEL
REF IN
N.C.
GND
TO IV-39
BOARD
CN702
IC905
SWITCH
TO FM-30 (2/4)
9V
5V
-9V
GND
SYNC
TO FM-30
BOARD
(2/4)
9V
GND
Fsc
GND


UTPUT)
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
IC901
LINE RECEIVER
IC902
OP AMP
IC903
OP AMP
IC904
PHASE COMP
IC904 CX01216M
IC905
SWITCH
IC906
AMP
IC907
SYNC GENERATOR
IC907 CX01217M
IC930
BUFF
IC911
M.M
IC910
OP AMP
IC912
M.M
FL901
FL902
TP901
TP902
TP903
TP904
TP905
TP906
TP907
TP911
OVD
TO FM-30 BOARD (2/4)
TO FM-30 (4/4)
SCC
LALT
BF
BLK
SYNC
HD
SCB
TO FM-30 BOARD (4/4)
CN901 5P WHT
5V
H PHASE
GND
SC PHASE
0/180
TO VR-127 BOARD W202

FM-30 Board

BF401	G-2
BF402	H-2
BF403	H-4
CN101	I-1
CN102	I-1
CN301	M-6
CN401	B-1
CN402	F-1
CN403	D-1
CN901	M-5
CN902	J-1
CN903	L-1
CN904	K-1
CV201	J-8
CV202	L-7
D101	G-5
D102	F-5
D103	E-5
D201	J-8
D202	L-8
D901	J-1
D902	J-1
D903	K-2
D904	J-1
D905	L-1
D906	K-4
D907	K-4
D908	M-4
D909	M-4
D911	M-8
D922	K-2
D923	L-5
DL401	E-2
FL101	H-5
FL201	F-6
FL202	D-6
FL203	I-7
FL204	K-7
FL205	B-6
FL206	H-8
FL301	E-5
FL302	D-5
FL901	I-3
FL902	I-2
IC101	H-5 S
IC102	F-5 S
IC103	E-5 S
IC201	I-6
IC202	H-6 S
IC203	H-7 S
IC204	H-7 S
IC205	J-6 S
IC206	E-6
IC207	C-6
IC208	I-8
IC209	K-8
IC210	B-7
IC211	L-8 S
IC212	M-7 S
IC213	M-7 S
IC214	L-7 S
IC215	L-7 S
IC217	H-8 S
IC218	D-8 S
IC219	G-8 S
IC220	E-8 S
IC221	D-8
IC222	G-8
IC223	F-8
IC224	B-8 S
IC225	A-9 S
IC226	B-9 S
IC227	L-6 S
IC228	B-8 S
IC229	A-8 S
IC230	H-8 S
IC231	J-6 S
IC232	A-8 S
IC233	H-8 S
IC234	H-9 S
IC235	K-6
IC236	A-7 S
IC240	L-9 S
IC241	A-7 S
IC242	M-9
IC243	M-9 S
IC244	L-9
IC301	D-5 S
IC302	D-5 S
IC303	B-5 S
IC305	D-4
IC306	E-5
IC402	C-4
IC403	B-4
IC404	D-3
IC405	D-3 S
IC407	D-4
IC410	B-3 S
IC411	G-2 S
IC412	H-2
IC901	K-1 S
IC902	L-2 S
IC903	L-2 S
IC904	M-2 S
IC905	L-3 S
IC906	J-6 S
IC907	K-2 S
IC910	L-4 S
IC911	M-3 S
IC912	L-5 S
IC930	J-4 S
L101	H-5
L103	H-5
L104	H-7
L201	G-7
L202	E-6
L203	J-7
L204	J-7
L205	G-7
L206	C-6
L207	J-8
L208	L-8
L209	L-6
L210	C-8
L211	F-10
L212	E-9
L213	E-8
L214	H-8
L215	F-8
L301	D-5
L302	D-5
L303	C-5
L304	C-5
L305	B-4
L306	B-5
L307	A-4
L308	A-5
L402	D-4
L403	F-1
L404	H-1
L405	D-2
L410	I-3
L411	I-2
L901	I-4
L902	L-2
L903	I-1
L904	K-1
L905	K-1
L906	M-2
L907	J-5
L908	J-4
L909	K-2
L910	K-4
L911	J-3
L913	K-4
L914	M-2
L915	L-5
L921	J-4
Q101	G-4
Q102	H-4
Q103	F-4
Q104	G-4
Q105	E-4
Q106	E-4
Q107	F-5
Q108	F-4
Q109	G-4
Q110	F-4
Q301	D-5
Q302	B-5
Q303	B-5
Q401	A-3
Q402	A-4
Q403	B-3
Q404	B-4
Q405	B-3
Q406	B-2
Q407	B-2
Q408	B-2
Q409	B-2
Q410	A-3
Q411	A-2
Q412	B-2
Q413	B-2
Q414	A-2
Q415	C-3
Q416	C-2
Q417	C-2
Q418	C-2
Q419	C-2
Q421	D-3
Q422	D-3
Q423	D-4
Q424	C-4
Q425	A-3
Q427	D-1
Q428	D-3
Q429	D-3
Q430	E-2
Q431	E-2
Q432	E-1
Q433	E-1
Q434	E-1
Q435	D-2
Q436	D-2
Q437	D-2
Q438	E-2
Q455	H-2
Q456	H-2
Q457	H-2
Q458	F-1
Q459	F-1
Q460	F-1
Q461	C-3
Q462	B-4
Q463	D-4
Q465	D-4
Q466	H-2
Q470	G-3
Q471	G-3
Q472	G-3
Q473	F-3
Q474	F-3
Q475	F-3
Q476	G-4
Q477	G-4
Q478	F-4
Q479	F-4
Q480	F-4
Q481	E-4
Q482	F-2
Q483	F-3
Q484	H-2
Q485	H-2
Q486	H-3
Q487	E-3
Q488	E-3
Q489	F-3
Q901	J-1
Q902	J-2
Q903	J-2
Q904	K-2
Q905	L-2
RV101	G-4
RV102	F-5
RV103	E-5
RV202	B-8
RV203	J-7
RV401	A-4
RV402	C-4
RV403	B-4
RV404	B-4
RV405	B-2
RV406	B-2
RV407	C-2
RV408	D-4
RV409	D-3
RV410	D-1
RV412	E-2
RV416	F-2
RV419	B-4
RV420	A-4
RV421	D-2
RV423	G-2
RV430	H-3
RV431	G-3
RV432	G-4
RV433	F-4
RV435	H-4
RV436	F-4
RV438	E-4
RV440	F-2
RV441	E-3
RV442	F-3
RV443	G-3
RV444	H-3
RV901	L-3
TP101	G-5
TP102	G-5
TP103	E-5
TP104	F-5
TP201	I-7
TP202	J-10
TP203	J-10
TP205	K-9
TP206	L-8
TP207	L-8
TP301	C-5
TP302	C-5
TP303	A-5
TP401	A-1
TP402	B-3
TP403	B-1
TP404	B-3
TP405	C-1
TP406	C-3
TP407	C-1
TP409	E-1
TP410	D-2
TP411	F-1
TP413	G-1
TP414	G-1
TP420	E-3
TP421	E-3
TP422	E-4
TP423	E-4
TP425	F-3
TP426	F-3
TP427	H-3
TP901	M-2
TP902	L-2
TP903	K-2
TP904	J-4
TP905	K-2
TP906	L-3
TP907	J-4
TP911	J-4
X901	K-4
X902	K-3

FM-30 (SYNC GENERATOR , GENLOCK , SIGNAL OUTPUT)



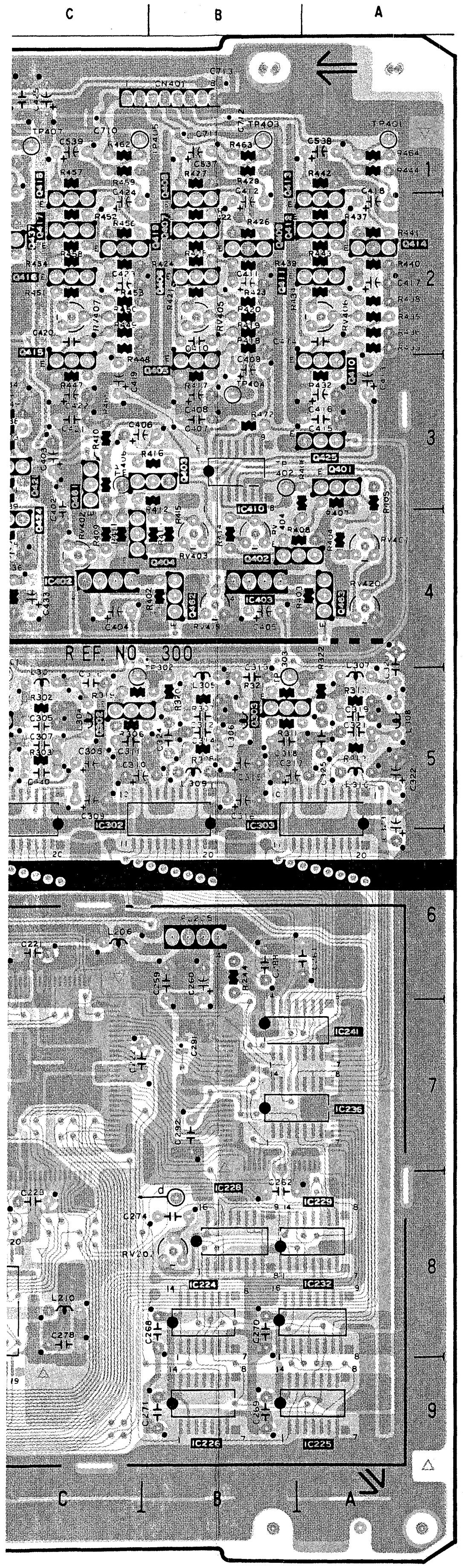
FM-30 -
1-642-278-12

▨ : Soldering side

▨ : Component side

SYNC GENERATOR (2) SYNC GENERATOR (2)

FM-30 **FM-30**


C
B
A
REF. NO. 300
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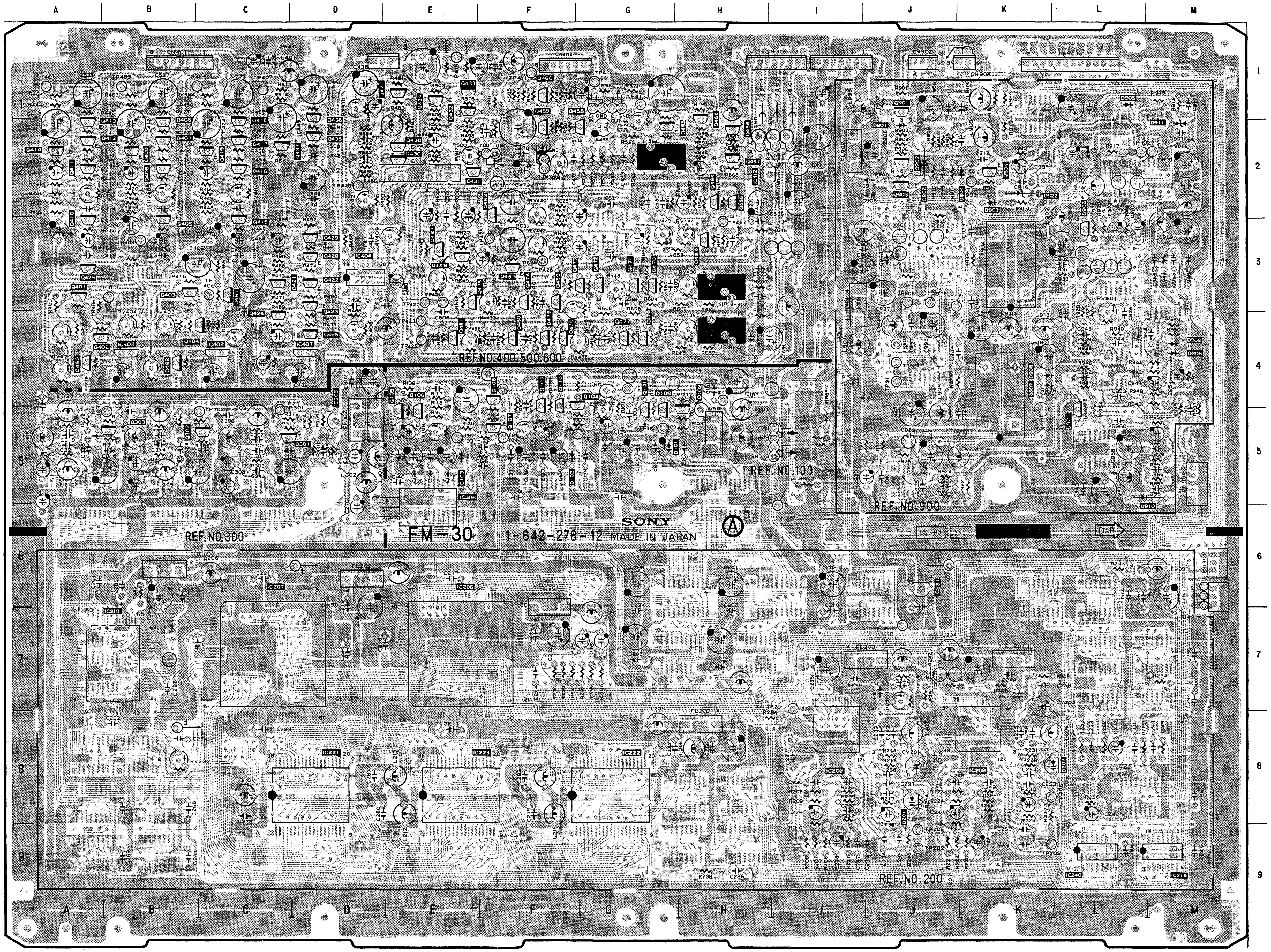
FM-30 —SOLDERING SIDE—
1-642-278-12


A
B
C
D
E
F
G
H
I
J
K
L
M
REF.NO.400.500.600
REF.NO.100
REF.NO.900
REF.NO.300
FM-30
SONY
1-642-278-12 MADE IN JAPAN
DIP
REF.NO.200
1
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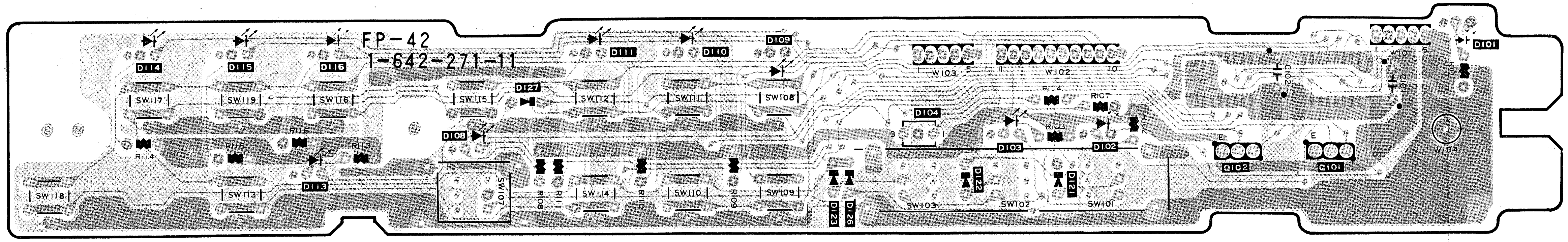
FM-30 —COMPONENT SIDE—
1-642-278-12

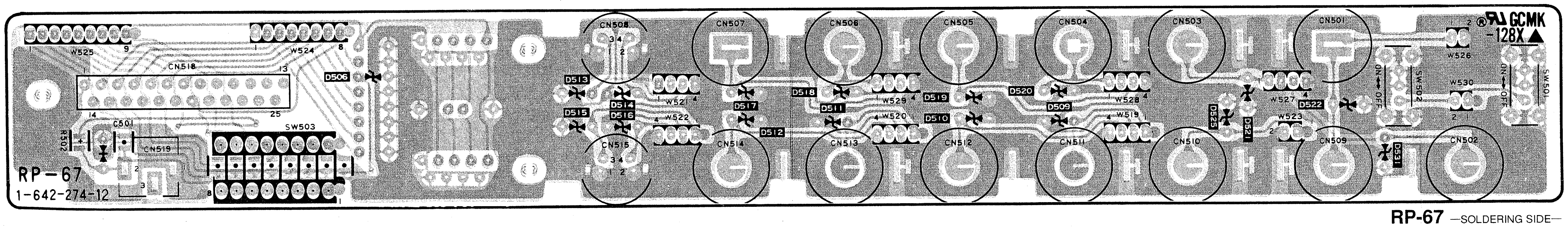
SYNC GENERATOR (2) SYNC GENERATOR (2)

FM-30 **FM-30**

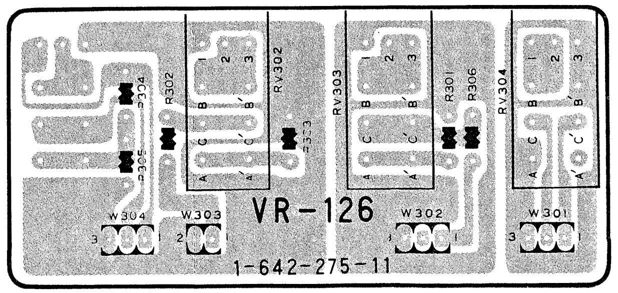
FP-42 (MODE CONTROL , FUNCTION SWITCH DISPLAY), RP-67 (INPUT/OUTPUT CONNECTOR) , VR-126 / VR-127 (VOLUME)


FP-42
1-642-271-11
D114
D115
D116
D111
D110
D109
D101
SW117
SW119
SW116
SW115
SW112
SW111
SW108
SW118
SW113
SW107
SW114
SW110
SW109
SW103
SW102
SW101
D127
D108
D113
D104
D103
D102
D122
D121
D123
D126
R114
R115
R116
R113
R108
R111
R110
R109
W103
W102
W101
W104
C102
C101
Q102
Q101
E

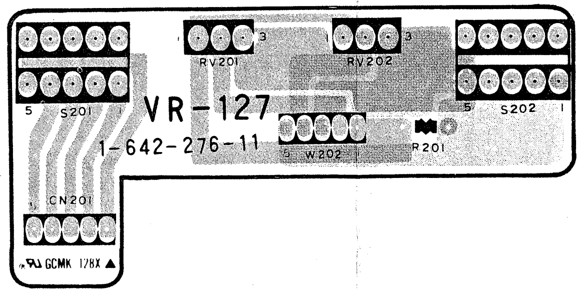
FP-42 —SOLDERING SIDE—
1-642-271-11


RP-67
1-642-274-12
GCMK
-128X
W525
W524
CN518
CN519
C501
R302
SW503
D506
CN508
CN507
CN506
CN505
CN504
CN503
CN501
CN515
CN514
CN513
CN512
CN511
CN510
CN509
CN502
D513
D514
D515
D516
D517
D512
D518
D511
D519
D510
D520
D509
D525
D521
D522
D531
W521
W522
W529
W520
W528
W519
W527
W523
W526
W530
SW502
SW501
ON ↔ OFF

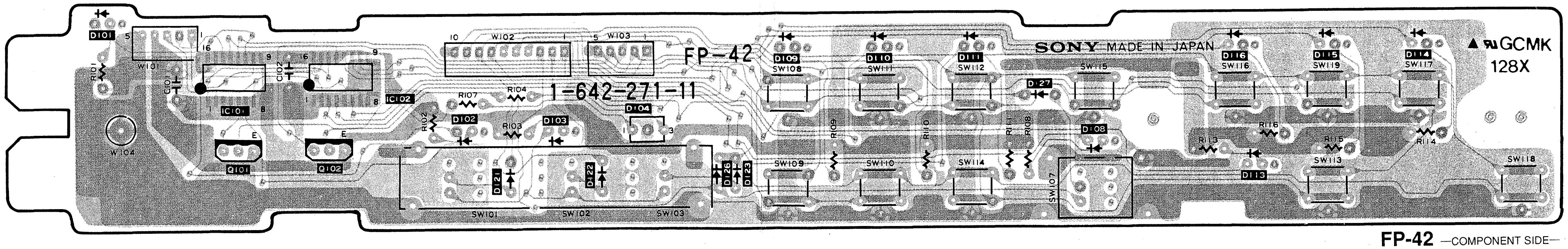
RP-67 —SOLDERING SIDE—
1-642-274-12


VR-126
1-642-275-11
RV302
RV303
RV304
R302
R301
R306
R304
R305
R303
W304
W303
W302
W301
A
B
C

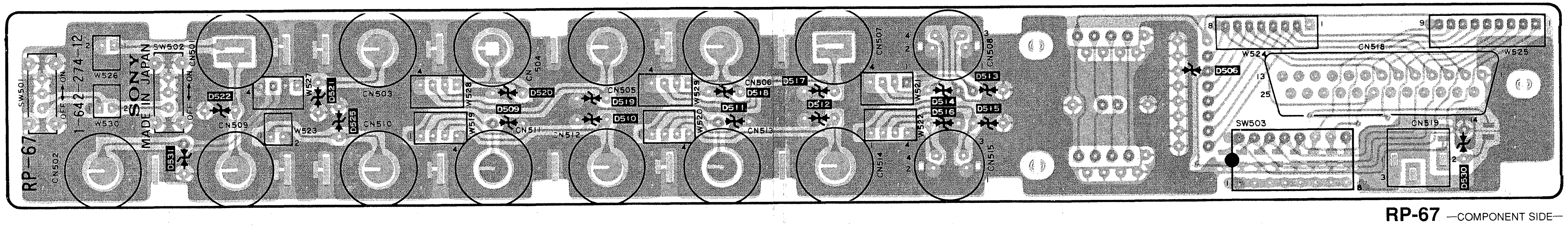
VR-126 —SOLDERING SIDE—
1-642-275-11


VR-127
1-642-276-11
RV201
RV202
S201
S202
W202
R201
CN201
GCMK 178X

VR-127 —SOLDERING SIDE—
1-642-276-11


D101
R101
W101
5
16
IC101
C101
C102
9
8
1
IC102
10
W102
1
5
W103
FP-42
1-642-271-11
R107
R104
D102
R102
R103
D103
D104
3
W104
E
Q101
Q102
D121
D122
D126
D123
SW101
SW102
SW103
D109
SW108
D110
SW111
D111
SW112
SONY MADE IN JAPAN
D127
SW115
R109
R110
R111
R108
D108
SW109
SW110
SW114
SW107
D116
SW116
D115
SW119
D114
SW117
▲ GCMK
128X
R113
R116
R115
R114
D113
SW113
SW118

FP-42 —COMPONENT SIDE—
1-642-271-11

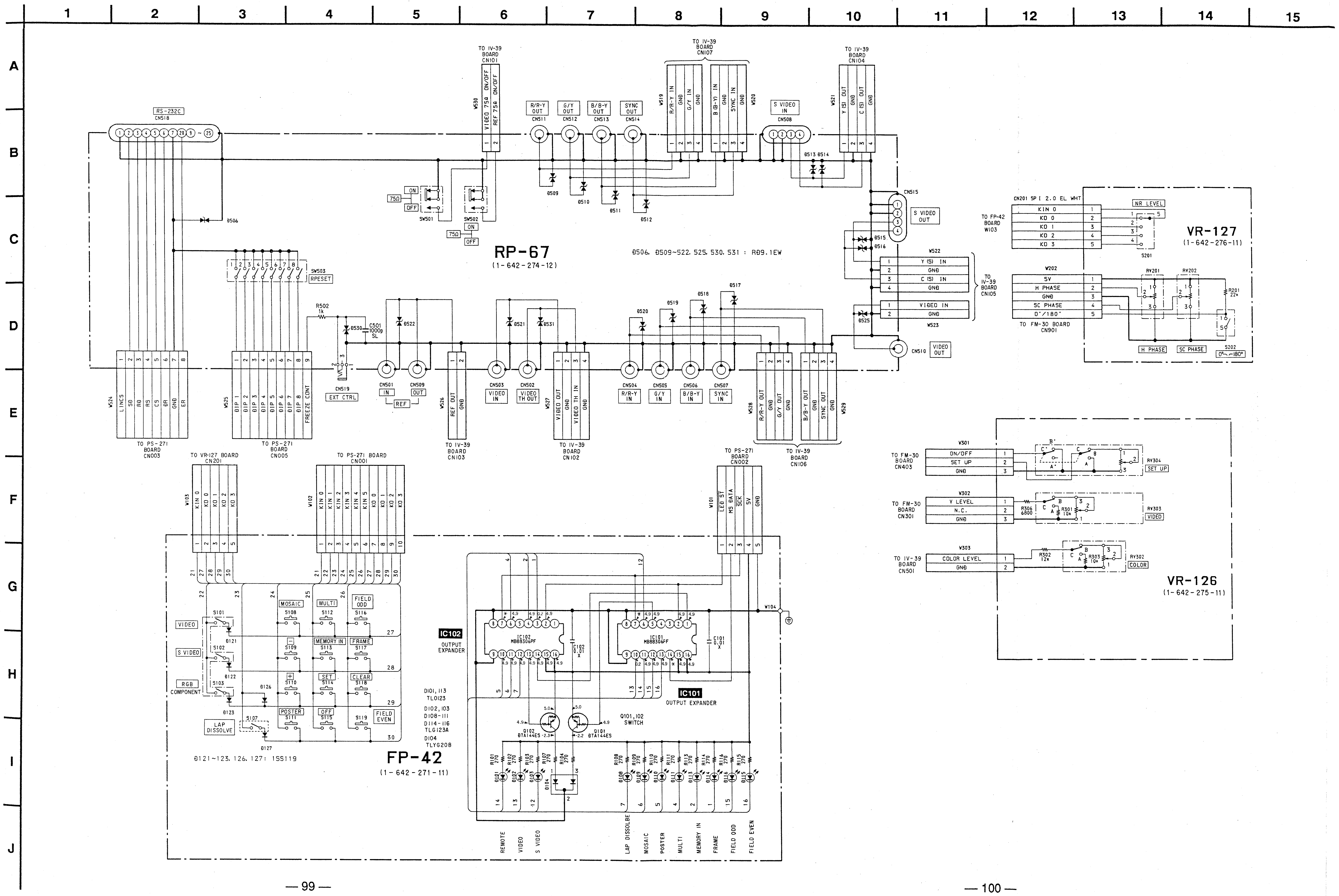

RP-67
CN502
SW501
OFF ON
W526
W530
1-642-274-12
SONY
MADE IN JAPAN
SW502
CN501
D522
CN509
W523
W527
D521
D525
D531
CN503
CN510
W528
W519
CN504
D509
D520
CN511
CN512
CN505
D519
D510
W529
W520
CN506
D518
D511
CN513
D517
D512
CN507
W521
W522
CN514
D514
D516
D513
D515
CN508
CN515
W524
D506
CN518
W525
13
25
SW503
CN519
D530

RP-67 —COMPONENT SIDE—
1-642-274-12

• ▨ : Soldering side

• ▨ : Component side

FP-42 (MODE CONTROL , FUNCTION SWITCH DISPLAY) , RP-67 (INPUT/OUTPUT CONNECTOR) , VR-126 / VR-127 (VOLUME)



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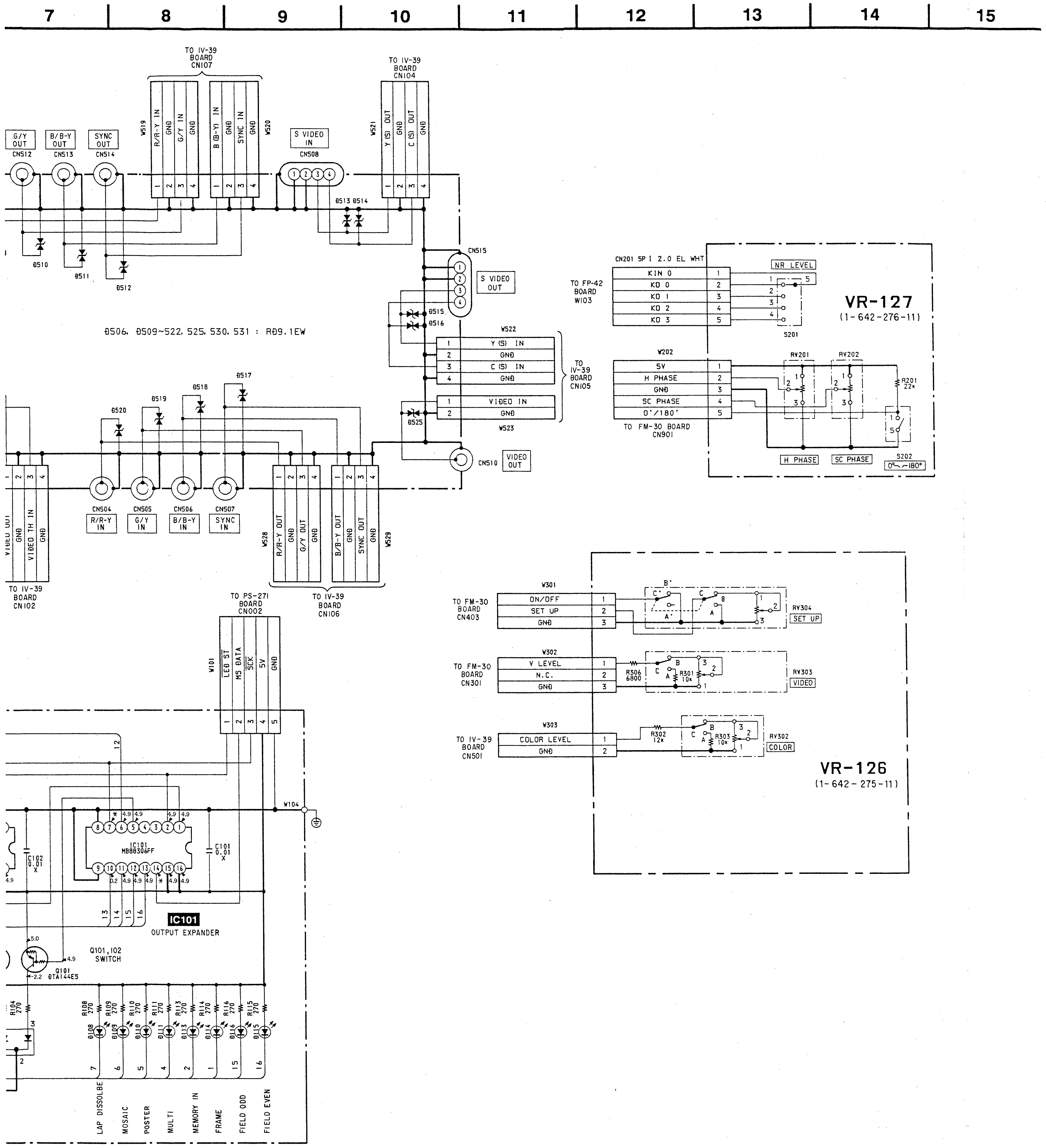
9
10
11
12
13
14
15
A
B
C
D
E
F
G
H
I
J
RP-67
(1-642-274-12)
FP-42
(1-642-271-11)
VR-127
(1-642-276-11)
VR-126
(1-642-275-11)
RS-232C
CN518
TO IV-39 BOARD CN101
W530
VIDEO 75Ω ON/OFF
REF 75Ω ON/OFF
R/R-Y OUT CN511
G/Y OUT CN512
B/B-Y OUT CN513
SYNC OUT CN514
TO IV-39 BOARD CN107
W519
R/R-Y IN
GND
G/Y IN
GND
B (B-Y) IN
GND
SYNC IN
GND
W520
S VIDEO IN CN508
TO IV-39 BOARD CN104
W521
Y (S) OUT
GND
C (S) OUT
GND
D513 D514
75Ω
ON
OFF
SW501
SW502
D506
D509
D510
D511
D512
CN515
S VIDEO OUT
D515
D516
D506, D509~522, 525, 530, 531 : RD9.1EW
W522
Y (S) IN
GND
C (S) IN
GND
VIDEO IN
GND
W523
TO IV-39 BOARD CN105
D525
CN510
VIDEO OUT
SW503
RPESET
R502 1k
D530
C501 1000p SL
D522
D521
D531
D520
D519
D518
D517
CN519
EXT CTRL
CN501 IN
CN509 OUT
REF
CN503 VIDEO IN
CN502 VIDEO TH OUT
CN504 R/R-Y IN
CN505 G/Y IN
CN506 B/B-Y IN
CN507 SYNC IN
W524
L INCS
SD
RD
RS
CS
DR
GND
ER
TO PS-271 BOARD CN003
W525
DIP 1
DIP 2
DIP 3
DIP 4
DIP 5
DIP 6
DIP 7
DIP 8
FREEZE CONT
TO PS-271 BOARD CN005
W526
REF OUT
GND
TO IV-39 BOARD CN103
W527
VIDEO OUT
GND
VIDEO TH IN
GND
TO IV-39 BOARD CN102
W528
R/R-Y OUT
GND
G/Y OUT
GND
W529
B/B-Y OUT
GND
SYNC OUT
GND
TO IV-39 BOARD CN106
TO PS-271 BOARD CN002
CN201 SP I 2.0 EL WHT
KIN 0
KO 0
KO 1
KO 2
KO 3
TO FP-42 BOARD W103
NR LEVEL
S201
W202
5V
H PHASE
GND
SC PHASE
0°/180°
TO FM-30 BOARD CN901
RV201
RV202
R201 22k
S202
H PHASE
SC PHASE
0°~180°
W301
ON/OFF
SET UP
GND
TO FM-30 BOARD CN403
RV304
SET UP
W302
V LEVEL
N.C.
GND
TO FM-30 BOARD CN301
R306 6800
R301 10k
RV303
VIDEO
W303
COLOR LEVEL
GND
TO IV-39 BOARD CN501
R302 12k
R303 10k
RV302
COLOR
TO VR-127 BOARD CN201
W103
KIN 0
KIN 1
KO 0
KO 1
KO 2
KO 3
TO PS-271 BOARD CN001
W102
KIN 0
KIN 1
KIN 2
KIN 3
KIN 4
KIN 5
KO 0
KO 1
KO 2
KO 3
W101
LED ST
MS DATA
SCK
5V
GND
VIDEO
S VIDEO
RGB COMPONENT
LAP DISSOLVE
S101
S102
S103
S107
D121
D122
D123
D126
D127
MOSAIC S108
S109
S110
POSTER S111
MULTI S112
MEMORY IN S113
SET S114
OFF S115
FIELD ODD S116
FRAME S117
CLEAR S118
FIELD EVEN S119
D121~123, 126, 127 : 1SS119
IC102
OUTPUT EXPANDER
IC102 MB88306PF
C102 0.01
IC101
MB88306PF
C101 0.01
OUTPUT EXPANDER
W104
D101, 113 TLO123
D102, 103 D108-111 D114-116 TLG123A
D104 TLYG20B
Q102 DTA144ES
Q101 DTA144ES
Q101, 102 SWITCH
R101 270
R102 270
R103 270
R107 270
R104 270
R108 270
R109 270
R110 270
R111 270
R113 270
R114 270
R116 270
R115 270
REMOTE
VIDEO
S VIDEO
LAP DISSOLBE
MOSAIC
POSTER
MULTI
MEMORY IN
FRAME
FIELD ODD
FIELD EVEN

ECTOR) , VR-126 / VR-127 (VOLUME)


7
8
9
10
11
12
13
14
15
TO IV-39 BOARD CN107
TO IV-39 BOARD CN104
G/Y OUT CN512
B/B-Y OUT CN513
SYNC OUT CN514
S VIDEO IN CN508
CN515
S VIDEO OUT
TO IV-39 BOARD CN105
VIDEO OUT CN510
CN504 R/R-Y IN
CN505 G/Y IN
CN506 B/B-Y IN
CN507 SYNC IN
TO IV-39 BOARD CN102
TO PS-271 BOARD CN002
TO IV-39 BOARD CN106
D506, D509~522, 525, 530, 531 : RD9.1EW
TO FP-42 BOARD W103
CN201 SP I 2.0 EL WHT
KIN 0
KO 0
KO 1
KO 2
KO 3
NR LEVEL
S201
VR-127
(1-642-276-11)
W202
5V
H PHASE
GND
SC PHASE
0°/180°
TO FM-30 BOARD CN901
RV201
RV202
R201 22k
H PHASE
SC PHASE
S202
0°~180°
TO FM-30 BOARD CN403
W301
ON/OFF
SET UP
GND
RV304
SET UP
TO FM-30 BOARD CN301
W302
V LEVEL
N.C.
GND
R306 6800
R301 10k
RV303
VIDEO
TO IV-39 BOARD CN501
W303
COLOR LEVEL
GND
R302 12k
R303 10k
RV302
COLOR
VR-126
(1-642-275-11)
W101
LED ST
MS DATA
SCK
5V
GND
W104
IC101 MB88306FF
C101 0.01
C102 0.01
IC101
OUTPUT EXPANDER
Q101,102 SWITCH
Q101 DTA144ES
LAP DISSOLBE
MOSAIC
POSTER
MULTI
MEMORY IN
FRAME
FIELD ODD
FIELD EVEN

- **For schematic diagrams.**
- Caution when replacing chip parts.
  New parts must be attached after removal of chip.
  Be careful not to heat the minuts side of tantalum capacitor, because it is damaged by the heat.
- All resistors are in ohms, 1/4W unless otherwise noted.
  Chip resistor are 1/10W unless otherwise noted.
  kΩ : 1000Ω , MΩ : 1000kΩ .
- All capacitors are in μF unless otherwise noted. pF: μμF.
  50V or less are not indicated except for electrolytics and tantalums.
- All variable and adjustable resistors have characteristic curve B, unless otherwise noted.
- ▭ : panel designation.
- ▭ : adjustment for repeair.
- ━ : B+ Line.
- Circled numbers refer to waveforms.
- Voltages are dc between ground and measurement points.
- Readings are taken with a color-bar signal input.
- Readings are taken with a digital multimeter (DC10MΩ).
- Voltages are taken with a VOM (Input impedance 10MΩ).
- Voltage variations may be noted due to normal production tolerances.
- ✳: Impossible to measure the voltage at the marked points.
- SWITCH POSITION

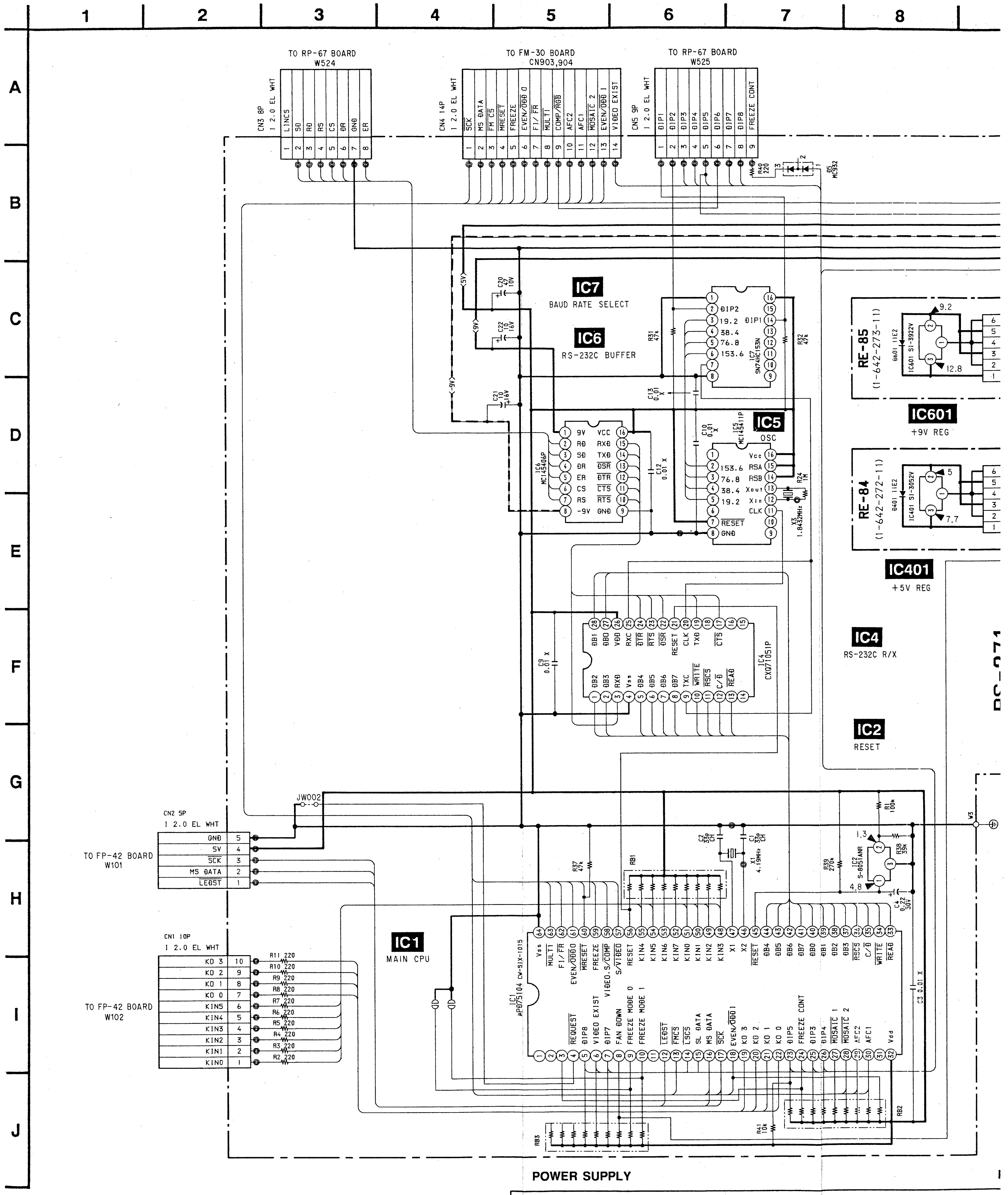
PICTURE EFFECT	OFF
MEMORY	FRAME
COLOR VIDEO SET UP	CLICK

- **For schematic diagrams.**
- Caution when replacing chip parts.
  New parts must be attached after removal of chip.
  Be careful not to heat the minuts side of tantalum capacitor, because it is damaged by the heat.
- All resistors are in ohms, 1/4W unless otherwise noted.
  Chip resistor are 1/10W unless otherwise noted.
  kΩ : 1000Ω , MΩ : 1000kΩ .
- All capacitors are in μF unless otherwise noted. pF: μμF.
  50V or less are not indicated except for electrolytics and tantalums.
- All variable and adjustable resistors have characteristic curve B, unless otherwise noted.
- ⊏w~⊐ : fusible resistor.
- ▭ : panel designation.
- ▭ : adjustment for repair.
- ━━ : B+ Line.
- Circled numbers refer to waveforms.
- Voltages are dc between ground and measurement points.
- Readings are taken with a color-bar signal input.
- Readings are taken with a digital multimeter (DC10MΩ).
- Voltages are taken with a VOM (Input impedance 10MΩ).
- Voltage variations may be noted due to normal production tolerances.
- ✳: Impossible to measure the voltage at the marked points.
- SWITCH POSITION

PICTURE EFFECT	OFF
MEMORY	FRAME
COLOR VIDEO SET UP	CLICK

Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

PS-271 (MAIN CPU , POWER SUPPLY) , RE-84 / RE-85 (+5V / +9V REG)


1
2
3
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5
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7
8
A
B
C
D
E
F
G
H
I
J
TO RP-67 BOARD W524
CN3 8P I 2.0 EL WHT
TO FM-30 BOARD CN903,904
CN4 14P I 2.0 EL WHT
TO RP-67 BOARD W525
CN5 9P I 2.0 EL WHT
IC7
BAUD RATE SELECT
IC6
RS-232C BUFFER
IC5
OSC
IC4
RS-232C R/X
IC2
RESET
IC1
MAIN CPU
IC601
+9V REG
IC401
+5V REG
RE-85 (1-642-273-11)
RE-84 (1-642-272-11)
CN2 5P I 2.0 EL WHT
TO FP-42 BOARD W101
CN1 10P I 2.0 EL WHT
TO FP-42 BOARD W102
JW002
POWER SUPPLY

PS-271, RE-84, RE-85

PS-271, RE-8

PS-271 (MAIN CPU , POWER SUPPLY) , RE-84 / RE-85 (+5V / +9V REG)

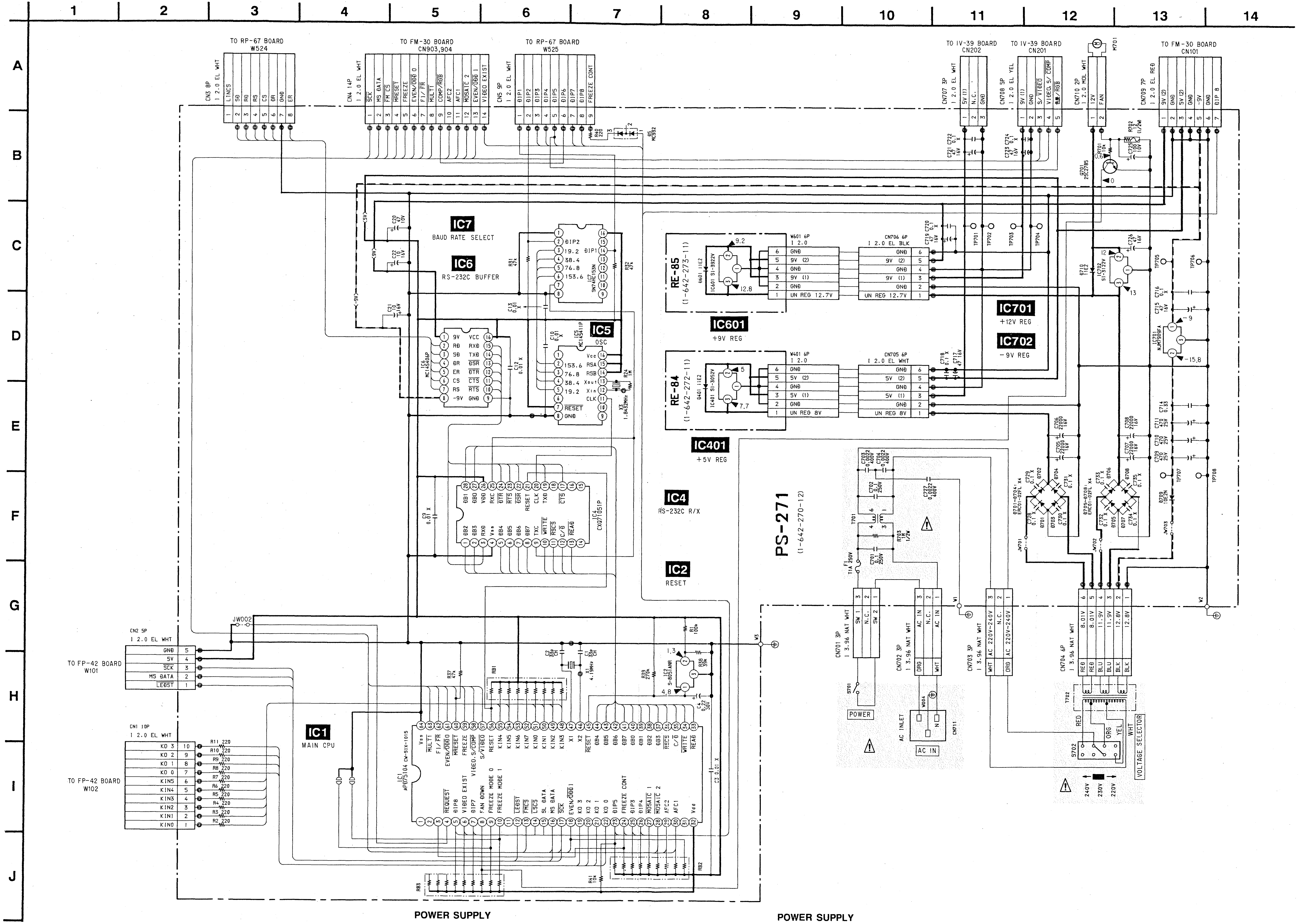
itor,

and

e B,

:tion

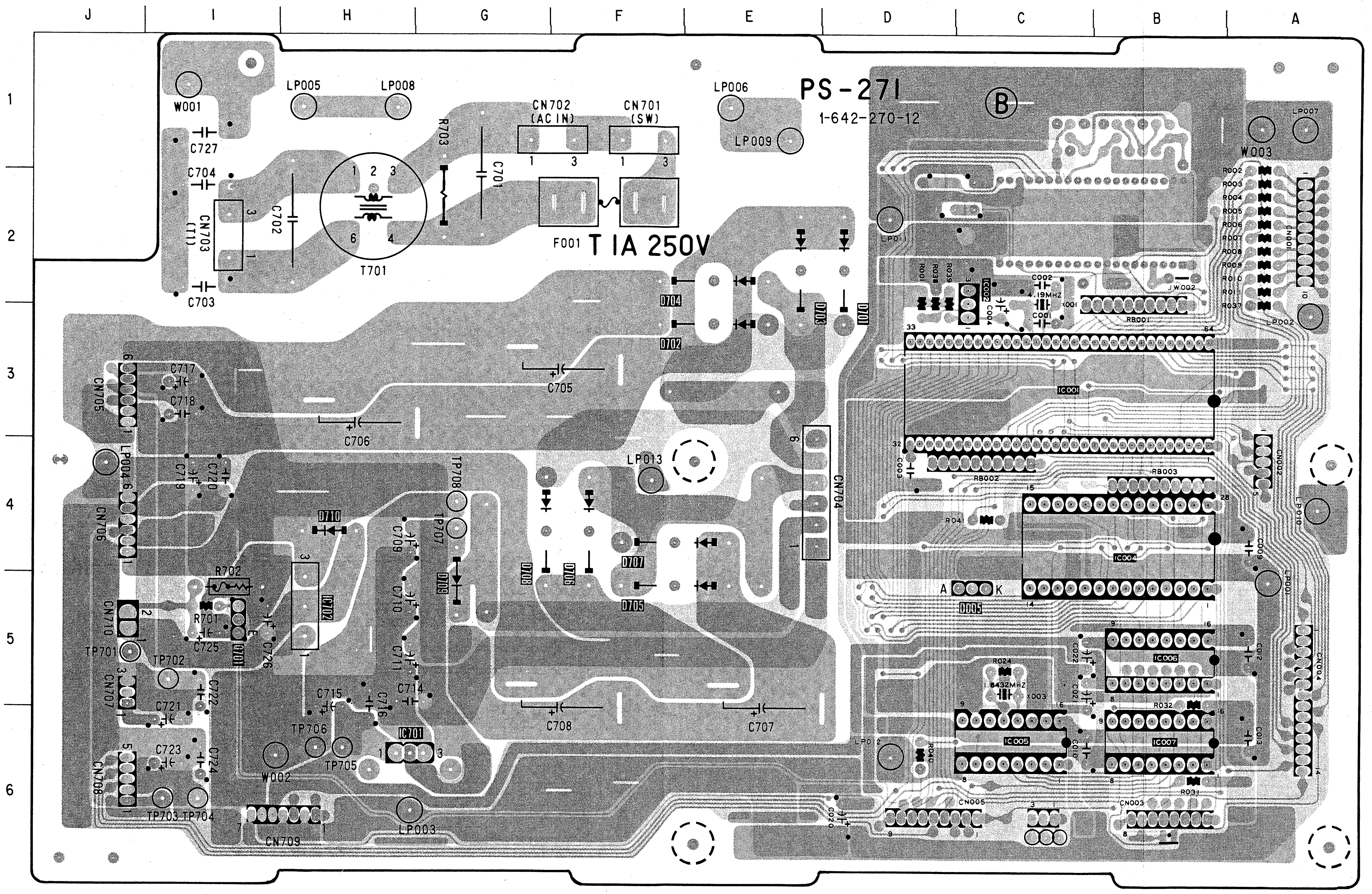
points.


1
2
3
4
5
6
7
8
9
10
11
12
13
14
A
B
C
D
E
F
G
H
I
J
TO RP-67 BOARD W524
CN3 8P I 2.0 EL WHT
TO FM-30 BOARD CN903,904
CN4 14P I 2.0 EL WHT
TO RP-67 BOARD W525
CN5 9P I 2.0 EL WHT
TO IV-39 BOARD CN202
CN707 3P I 2.0 EL WHT
TO IV-39 BOARD CN201
CN708 5P I 2.0 EL YEL
M701
CN710 2P I 2.0 MOL WHT
TO FM-30 BOARD CN101
CN709 7P I 2.0 EL RED
IC7
BAUD RATE SELECT
IC6
RS-232C BUFFER
IC5
OSC
IC4
RS-232C R/X
IC2
RESET
IC1
MAIN CPU
RE-85
(1-642-273-11)
IC601
+9V REG
RE-84
(1-642-272-11)
IC401
+5V REG
IC701
+12V REG
IC702
-9V REG
PS-271
(1-642-270-12)
TO FP-42 BOARD W101
CN2 5P I 2.0 EL WHT
TO FP-42 BOARD W102
CN1 10P I 2.0 EL WHT
JW002
CN701 3P I 3.96 NAT WHT
CN702 3P I 3.96 NAT WHT
CN703 3P I 3.96 NAT WHT
CN704 6P I 3.96 NAT WHT
POWER
AC INLET
AC IN
T701
T702
S702
VOLTAGE SELECTOR
240V
230V
220V

PS-271 (MAIN CPU , POWER SUPPLY) , RE-84 / RE-85 (+5V / +9V REG)

PS-271 Board

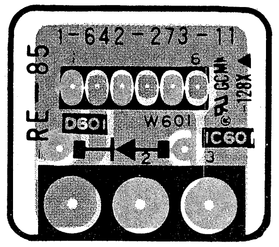
CN001	A-2
CN002	B-3
CN003	B-6
CN004	A-5
CN005	D-6
CN701	F-1
CN702	G-1
CN703	J-2
CN704	E-4
CN705	J-3
CN706	J-4
CN707	J-5
CN708	J-6
CN709	I-6
CN710	J-5
D701	E-3
D702	E-2
D703	E-3
D704	E-2
D705	F-4
D706	G-4
D707	F-4
D708	G-4
D709	H-4
D710	I-4
F001	F-2
IC001	C-3
IC002	D-2
IC004	C-4
IC005	D-6
IC006	C-5
IC007	C-6
IC701	H-6
IC702	I-4
LP001	B-4
LP002	A-2
LP003	H-6
LP004	J-3
LP005	I-1
LP006	F-1
LP007	A-1
LP008	H-1
LP009	E-1
LP010	A-4
LP011	D-2
LP012	E-5
Q701	I-5
RB001	C-2
RB002	D-3
RB003	B-3
T701	H-2
TP701	J-5
TP702	J-5
TP703	J-6
TP704	J-6
TP705	J-6
TP706	J-5
TP707	H-4
TP708	H-4
W001	J-1
W002	I-6
W003	B-1
X001	C-2
X003	C-5


J
I
H
G
F
E
D
C
B
A
1
2
3
4
5
6
PS-271
1-642-270-12
B
W001
LP005
LP008
LP006
LP009
LP007
W003
C727
C704
C702
C703
CN703 (T1)
R703
C701
CN702 (AC IN)
CN701 (SW)
T701
F001
T 1A 250V
LP011
R001
R038
R039
IC002
C002
C004
4.19MHZ
X001
C001
RB001
JW002
CN001
LP002
R002
R003
R004
R005
R006
R007
R008
R009
R010
R011
R037
D704
D702
D703
D701
C705
C706
C717
C718
CN705
LP004
C719
C720
CN706
TP708
TP707
D710
IC702
C709
C710
C711
D709
D708
D706
D707
D705
LP013
CN704
IC001
RB002
RB003
C003
IC004
R041
CN002
LP010
C009
LP001
A
K
D005
R702
R701
Q701
CN710
TP701
TP702
C725
C726
CN707
C721
C722
C723
C724
CN708
TP703
TP704
C715
C716
C714
TP706
TP705
IC701
W002
CN709
LP003
C708
C707
LP012
R040
IC005
R024
1.8432MHZ
X003
C022
C021
C010
IC006
IC007
R032
R031
C012
C013
CN004
CN005
CN003
C020

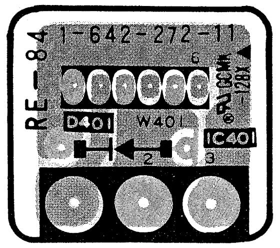
PS-271 —SOLDERING SIDE—
1-642-270-12

▨ : Soldering side

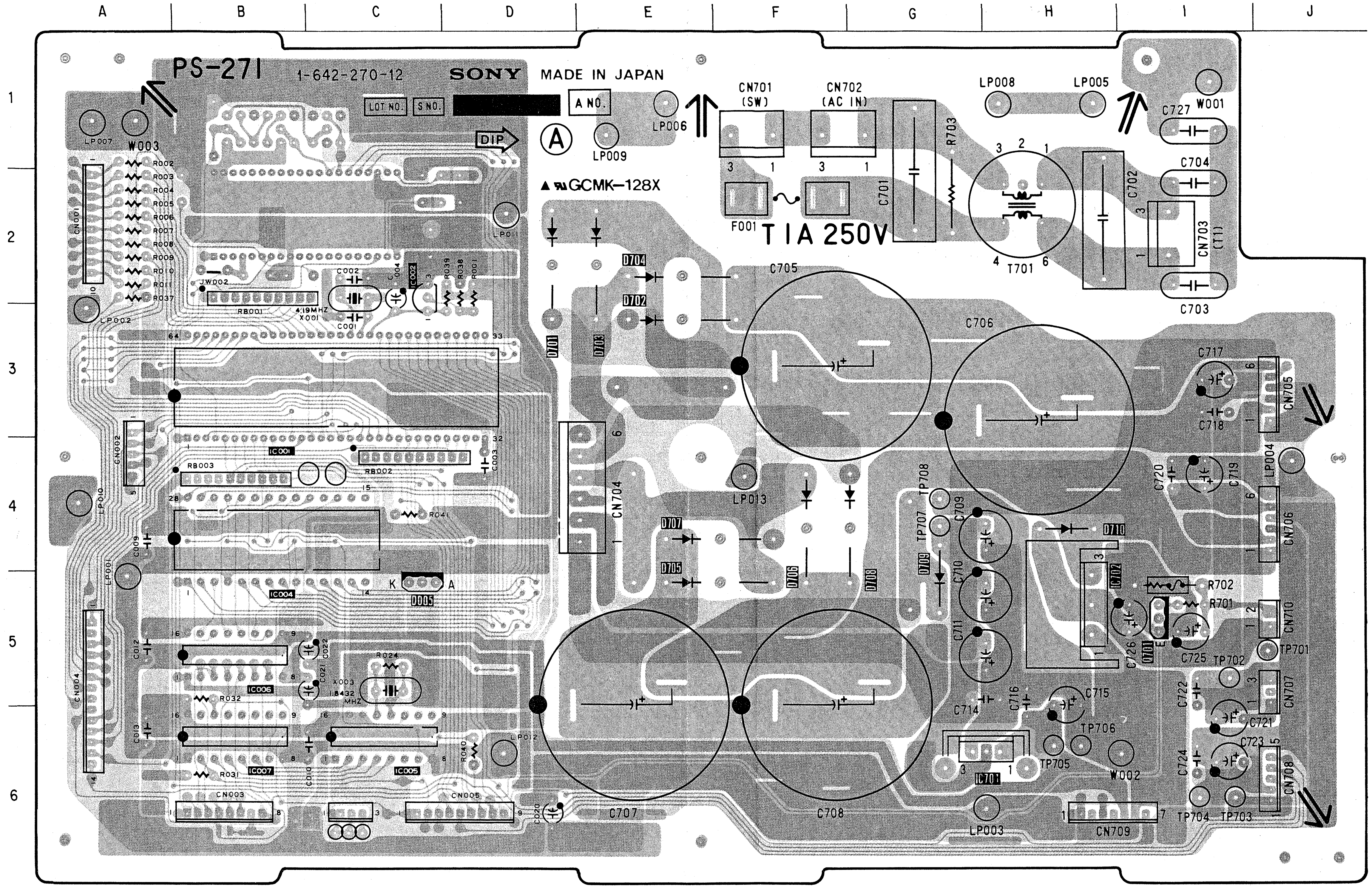
░ : Component side


1-642-273-11
RE-85
D601
W601
IC601
1
2
3

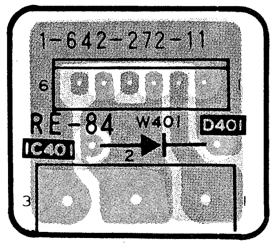
RE-85
—SOLDERING SIDE—
1-642-273-11


1-642-272-11
RE-84
D401
W401
IC401
1
2
3

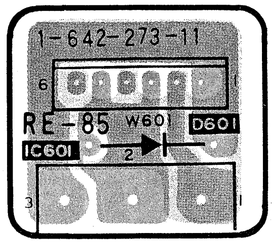
RE-84
—SOLDERING SIDE—
1-642-272-11


A
B
C
D
E
F
G
H
I
J
1
2
3
4
5
6
PS-271
1-642-270-12
SONY
MADE IN JAPAN
LOT NO.
S NO.
A NO.
DIP
A
GCMK-128X
LP007
W003
LP009
LP006
CN701 (SW)
CN702 (AC IN)
F001
T1A 250V
C701
R703
T701
LP008
LP005
W001
C727
C704
C702
CN703 (T1)
C703
CN001
R002
R003
R004
R005
R006
R007
R008
R009
R010
R011
R037
LP002
LP011
JW002
RB001
4.19MHZ
X001
C002
C001
C004
IC002
R039
R036
R001
D704
D702
D701
D703
C705
C706
C717
C718
CN705
IC001
RB003
RB002
CN002
C003
R041
LP010
C009
LP001
CN704
LP013
LP004
C720
C719
CN706
D707
D705
D706
D708
TP708
TP707
D709
C709
C710
C711
D710
IC702
R702
R701
CN710
TP701
C726
D701
C725
TP702
IC004
D005
K
A
C012
C022
C021
R024
X003
1.8432 MHZ
IC006
R032
CN004
C013
C010
IC007
R031
IC005
R040
LP012
C020
CN003
CN005
C707
C708
C714
C716
C715
TP706
TP705
IC701
W002
C722
C721
CN707
C723
C724
CN708
TP704
TP703
LP003
CN709

PS-271 —COMPONENT SIDE—
1-642-270-12


1-642-272-11
RE-84
W401
D401
IC401

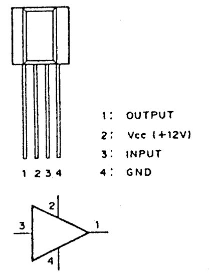
RE-84
—COMPONENT SIDE—
1-642-272-11


1-642-273-11
RE-85
W601
D601
IC601

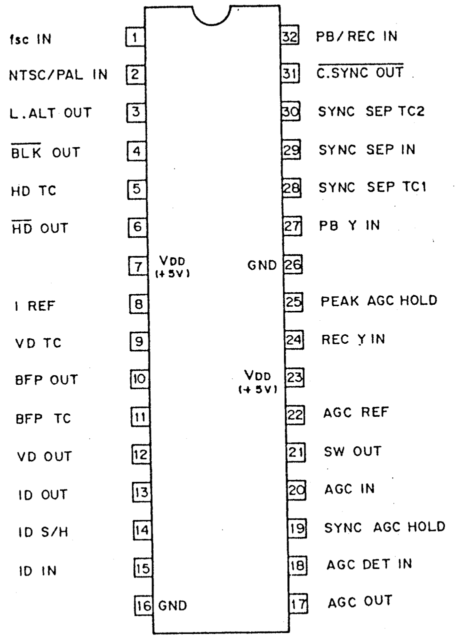
RE-85
—COMPONENT SIDE—
1-642-273-11

4-3. SEMICONDUCTORS

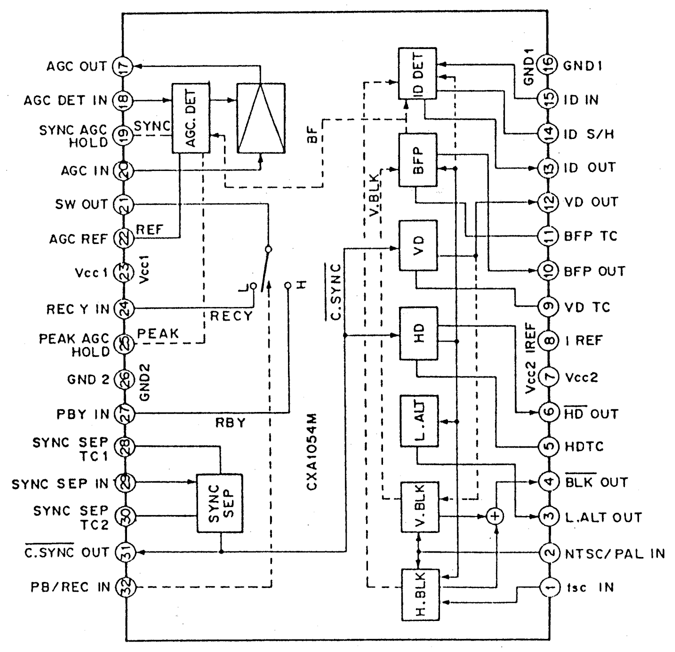
AN607P (MATSUSHITA)
AN608P (MATSUSHITA)
WIDE BAND AMPLIFIER
– PRINTED SIDE VIEW –


1 2 3 4
1: OUTPUT
2: Vcc (+12V)
3: INPUT
4: GND
1
2
3
4

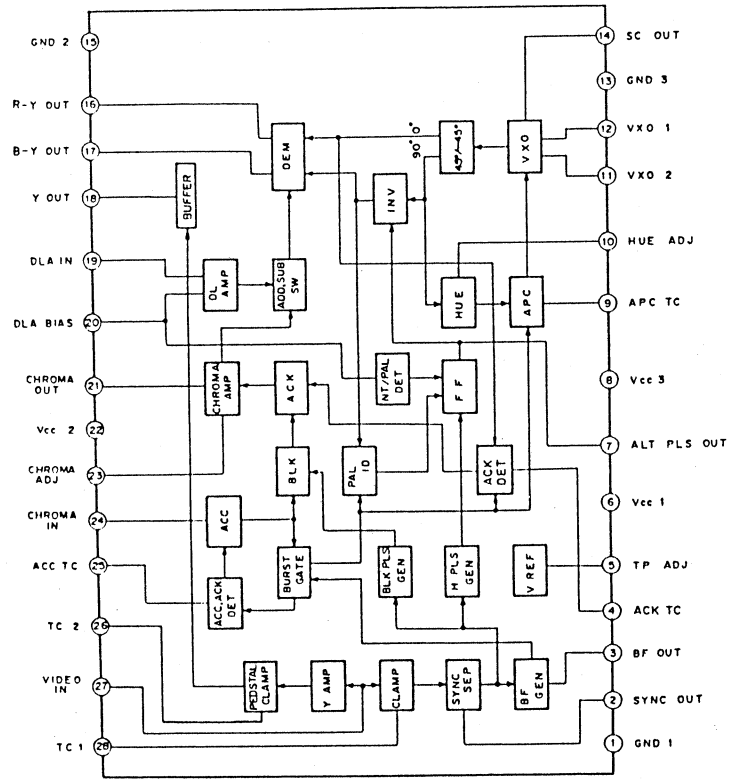
CXA1054M (SONY)
AGC, PULSE GENERATOR
– TOP VIEW –


fsc IN 1
NTSC/PAL IN 2
L.ALT OUT 3
BLK OUT 4
HD TC 5
HD OUT 6
7 VDD (+5V)
I REF 8
VD TC 9
BFP OUT 10
BFP TC 11
VD OUT 12
ID OUT 13
ID S/H 14
ID IN 15
16 GND
32 PB/REC IN
31 C.SYNC OUT
30 SYNC SEP TC2
29 SYNC SEP IN
28 SYNC SEP TC1
27 PB Y IN
26 GND
25 PEAK AGC HOLD
24 REC Y IN
23 VDD (+5V)
22 AGC REF
21 SW OUT
20 AGC IN
19 SYNC AGC HOLD
18 AGC DET IN
17 AGC OUT

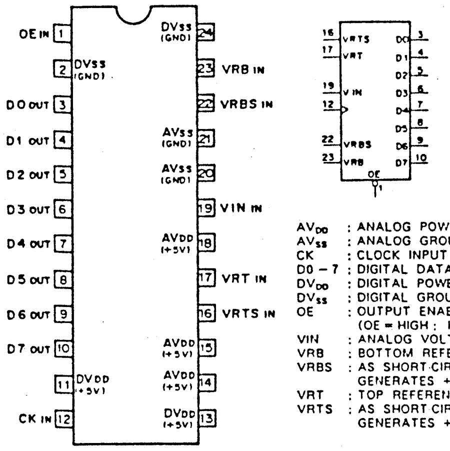
CXA1054M(2/2)


AGC OUT 17
AGC DET IN 18
SYNC AGC HOLD 19
AGC IN 20
SW OUT 21
AGC REF 22
Vcc1 23
REC Y IN 24
PEAK AGC HOLD 25
GND 2 26
PBY IN 27
SYNC SEP TC1 28
SYNC SEP IN 29
SYNC SEP TC2 30
C.SYNC OUT 31
PB/REC IN 32
SYNC
AGC DET
REF
Vcc1
PEAK
GND2
RECY
RBY
BF
V.BLK
C.SYNC
CXA1054M
ID DET
BFP
VD
HD
L.ALT
V.BLK
H.BLK
GND1
Vcc2
IREF
16 GND1
15 ID IN
14 ID S/H
13 ID OUT
12 VD OUT
11 BFP TC
10 BFP OUT
9 VD TC
8 I REF
7 Vcc2
6 HD OUT
5 HDTC
4 BLK OUT
3 L.ALT OUT
2 NTSC/PAL IN
1 fsc IN

CXA1228S (SONY)
C-MOS NTSC/PAL DECODER


GND 2 15
R-Y OUT 16
B-Y OUT 17
Y OUT 18
DLA IN 19
DLA BIAS 20
CHROMA OUT 21
Vcc 2 22
CHROMA ADJ 23
CHROMA IN 24
ACC TC 25
TC 2 26
VIDEO IN 27
TC 1 28
BUFFER
DL AMP
ADD.SUB SW
DEM
INV
90° 0°
45°/-45°
VXO
HUE
APC
CHROMA AMP
ACK
NT/PAL DET
FF
BLK
PAL ID
ACK DET
ACC
BURST GATE
BLK PLS GEN
H PLS GEN
V REF
ACC.ACK DET
PEDESTAL CLAMP
Y AMP
CLAMP
SYNC SEP
BF GEN
14 SC OUT
13 GND 3
12 VXO 1
11 VXO 2
10 HUE ADJ
9 APC TC
8 Vcc 3
7 ALT PLS OUT
6 Vcc 1
5 TP ADJ
4 ACK TC
3 BF OUT
2 SYNC OUT
1 GND 1

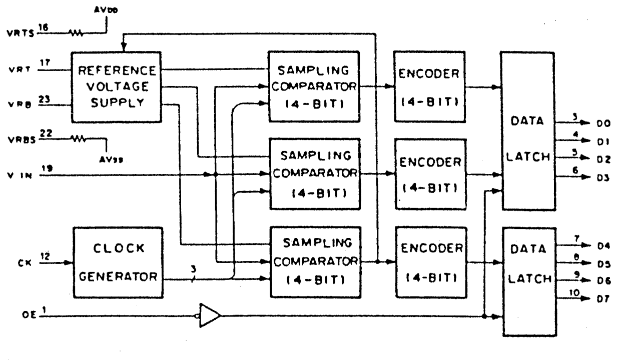
CXD1175AM (SONY) FLAT PACKAGE
C-MOS 8-BIT 20MSPS VIDEO A/D CONVERTER
– TOP VIEW –


OE IN 1
2 DVss (GND)
D0 OUT 3
D1 OUT 4
D2 OUT 5
D3 OUT 6
D4 OUT 7
D5 OUT 8
D6 OUT 9
D7 OUT 10
11 DVDD (+5V)
CK IN 12
24 DVss (GND)
23 VRB IN
22 VRBS IN
21 AVss (GND)
20 AVss (GND)
19 VIN IN
18 AVDD (+5V)
17 VRT IN
16 VRTS IN
15 AVDD (+5V)
14 AVDD (+5V)
13 DVDD (+5V)
16 VRTS
17 VRT
19 VIN
12
22 VRBS
23 VRB
OE 1
D0 3
D1 4
D2 5
D3 6
D4 7
D5 8
D6 9
D7 10

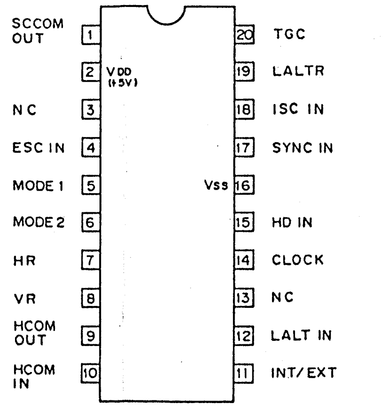
AV_{DD} : ANALOG POWER SUPPLY
AV_{SS} : ANALOG GROUND
CK : CLOCK INPUT
D0 – 7 : DIGITAL DATA OUTPUTS (LSB to MSB)
DV_{DD} : DIGITAL POWER SUPPLY
DV_{SS} : DIGITAL GROUND
OE : OUTPUT ENABLE
(OE = HIGH : HIGH IMPEDANCE)
VIN : ANALOG VOLTAGE INPUT
VRB : BOTTOM REFERENCE VOLTAGE INPUT
VRBS : AS SHORT-CIRCUIT AT VRB. GENERATES + 0.6V
VRT : TOP REFERENCE VOLTAGE INPUT
VRTS : AS SHORT-CIRCUIT AT VRT. GENERATES + 2.6V

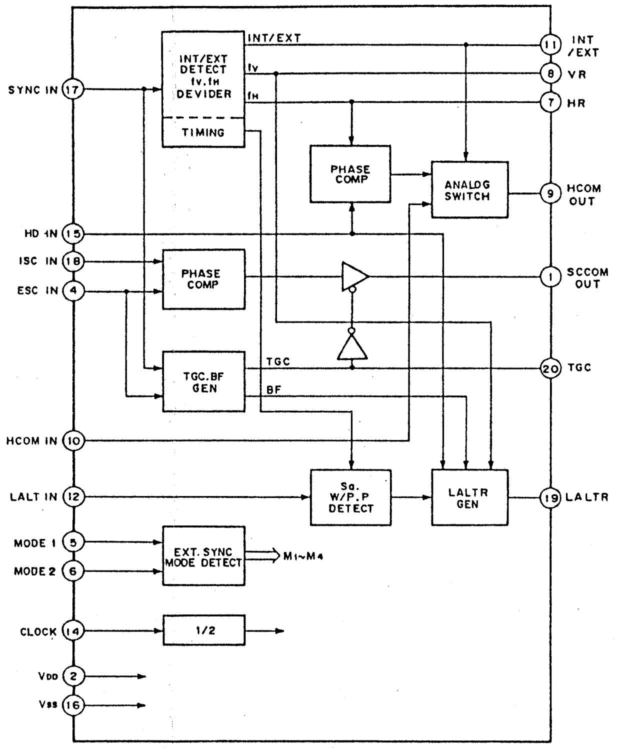
STEP	INPUT SIGNAL VOLTAGE	DATA OUTPUTS							
		D7	D6	D5	D4	D3	D2	D1	D0
0	0V (VRT)	1	1	1	1	1	1	1	1
1	0.01V	1	1	1	1	1	1	1	0
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
127	1.34V	1	0	0	0	0	0	0	0
128	1.35V	0	1	1	1	1	1	1	1
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
255	2.7V (VRB)	0	0	0	0	0	0	0	0

0 : LOW LEVEL
1 : HIGH LEVEL

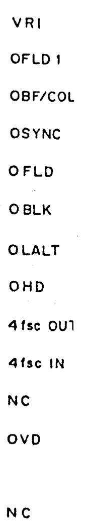

AVDD
VRTS 16
VRT 17
VRB 23
VRBS 22
AVss
VIN 19
CK 12
OE 1
REFERENCE VOLTAGE SUPPLY
SAMPLING COMPARATOR (4-BIT)
SAMPLING COMPARATOR (4-BIT)
SAMPLING COMPARATOR (4-BIT)
ENCODER (4-BIT)
ENCODER (4-BIT)
ENCODER (4-BIT)
CLOCK GENERATOR
3
DATA LATCH
DATA LATCH
3 D0
4 D1
5 D2
6 D3
7 D4
8 D5
9 D6
10 D7

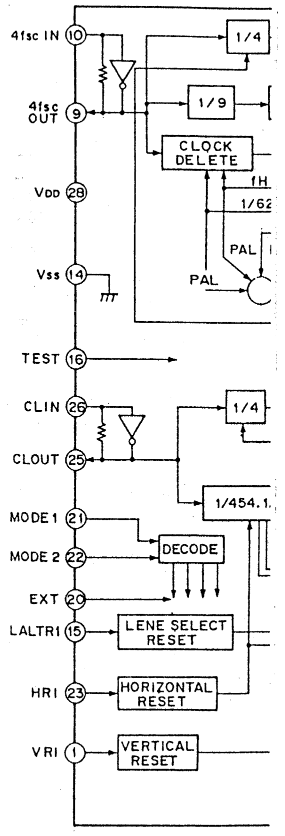
CXD1216M (SONY)
C-MOS GEN LOCK
– TOP VIEW –


SCCOM OUT 1
2 VDD (5V)
NC 3
ESC IN 4
MODE 1 5
MODE 2 6
HR 7
VR 8
HCOM OUT 9
HCOM IN 10
20 TGC
19 LALTR
18 ISC IN
17 SYNC IN
16 Vss
15 HD IN
14 CLOCK
13 NC
12 LALT IN
11 INT/EXT


SYNC IN 17
HD IN 15
ISC IN 18
ESC IN 4
HCOM IN 10
LALT IN 12
MODE 1 5
MODE 2 6
CLOCK 14
VDD 2
Vss 16
INT/EXT
INT/EXT DETECT fv.fH DEVIDER
fv
fH
TIMING
PHASE COMP
ANALOG SWITCH
PHASE COMP
TGC.BF GEN
TGC
BF
Sc. W/P.P DETECT
LALTR GEN
EXT. SYNC MODE DETECT
M1~M4
1/2
11 INT/EXT
8 VR
7 HR
9 HCOM OUT
1 SCCOM OUT
20 TGC
19 LALTR

CXD121
C-MOS
– TOP

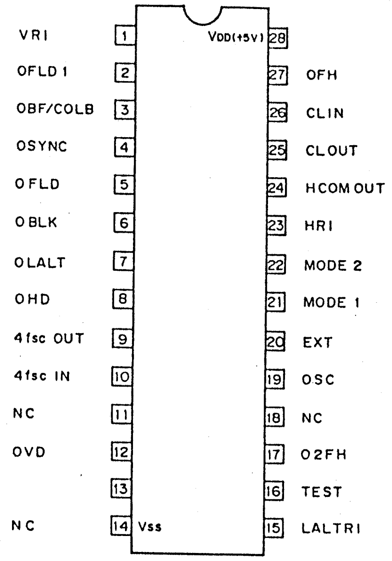

VRI
OFLD1
OBF/COL
OSYNC
OFLD
OBLK
OLALT
OHD
4fsc OUT
4fsc IN
NC
OVD
NC

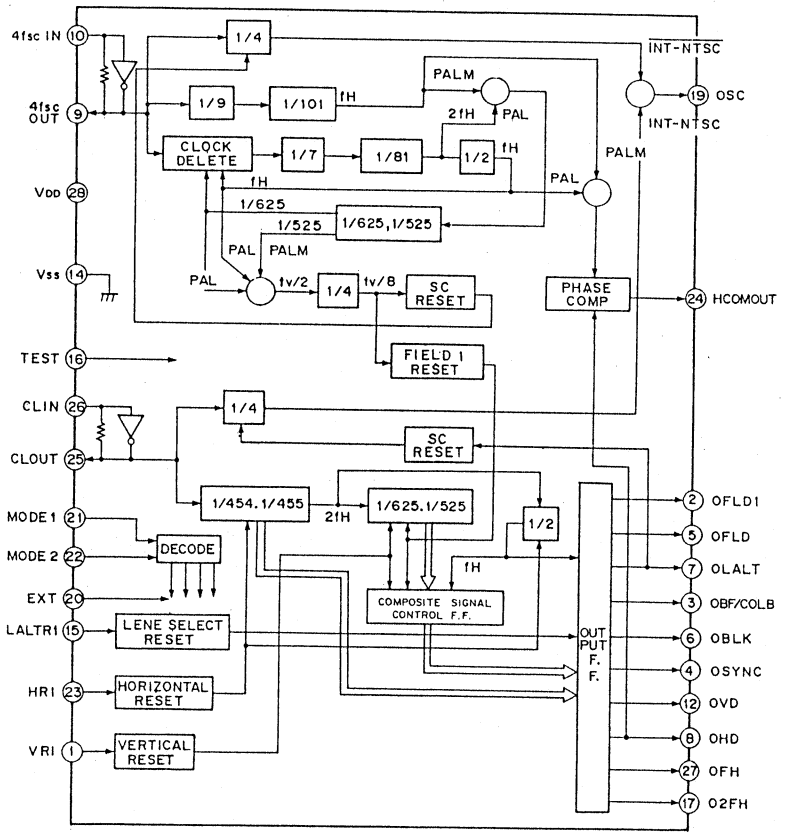

4fsc IN 10
4fsc OUT 9
VDD 28
Vss 14
TEST 16
CLIN 26
CLOUT 25
MODE 1 21
MODE 2 22
EXT 20
LALTRI 15
HRI 23
VRI 1
1/4
1/9
CLOCK DELETE
fH
1/62
PAL
PAL
1/4
1/454.1
DECODE
LENE SELECT RESET
HORIZONTAL RESET
VERTICAL RESET

CXD1217M (SONY)

C-MOS SYNC GENERATOR

- TOP VIEW -

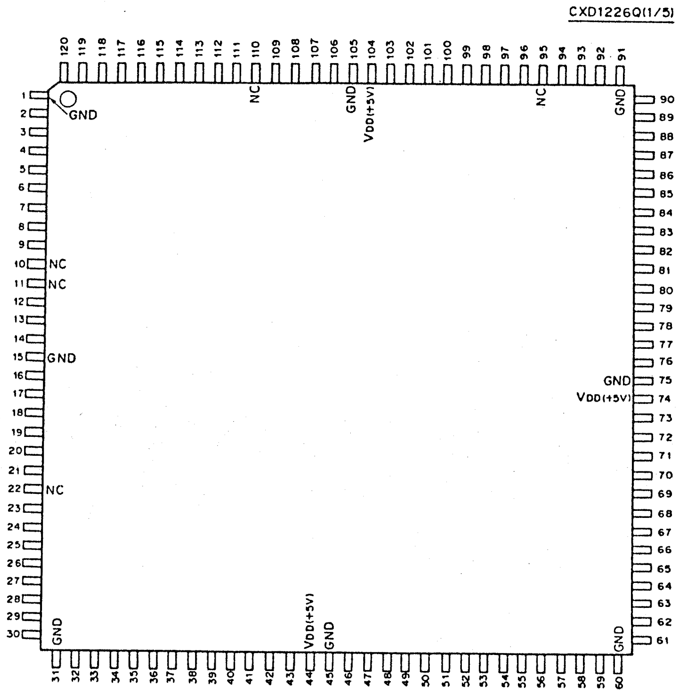

VRI 1
OFLD1 2
OBF/COLB 3
OSYNC 4
OFLD 5
OBLK 6
OLALT 7
OHD 8
4fsc OUT 9
4fsc IN 10
NC 11
OVD 12
13
NC 14 Vss
VDD(+5V) 28
27 OFH
26 CLIN
25 CLOUT
24 HCOMOUT
23 HRI
22 MODE 2
21 MODE 1
20 EXT
19 OSC
18 NC
17 O2FH
16 TEST
15 LALTRI

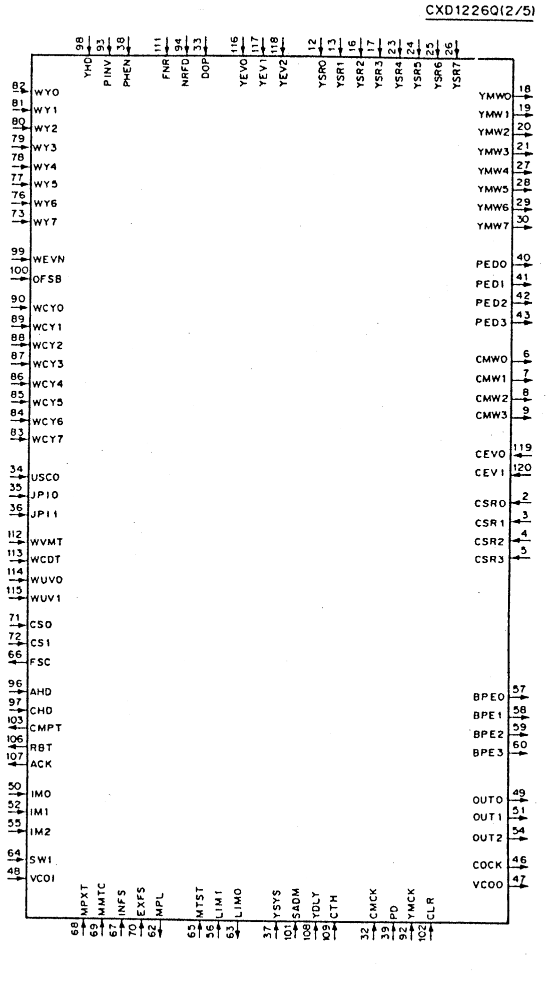

4fsc IN 10
4fsc OUT 9
VDD 28
Vss 14
TEST 16
CLIN 26
CLOUT 25
MODE1 21
MODE2 22
EXT 20
LALTRI 15
HRI 23
VRI 1
1/4
1/9
1/101
fH
PALM
2fH
PAL
CLOCK DELETE
1/7
1/81
1/2
fH
PAL
1/625
1/525
1/625,1/525
PAL PALM
PAL
fv/2
1/4
fv/8
SC RESET
PHASE COMP
FIELD 1 RESET
INT-NTSC
19 OSC
INT-NTSC
PALM
24 HCOMOUT
1/4
SC RESET
1/454.1/455
2fH
1/625.1/525
1/2
fH
DECODE
COMPOSITE SIGNAL CONTROL F.F.
LENE SELECT RESET
HORIZONTAL RESET
VERTICAL RESET
OUT PUT F.F.
2 OFLD1
5 OFLD
7 OLALT
3 OBF/COLB
6 OBLK
4 OSYNC
12 OVD
8 OHD
27 OFH
17 O2FH

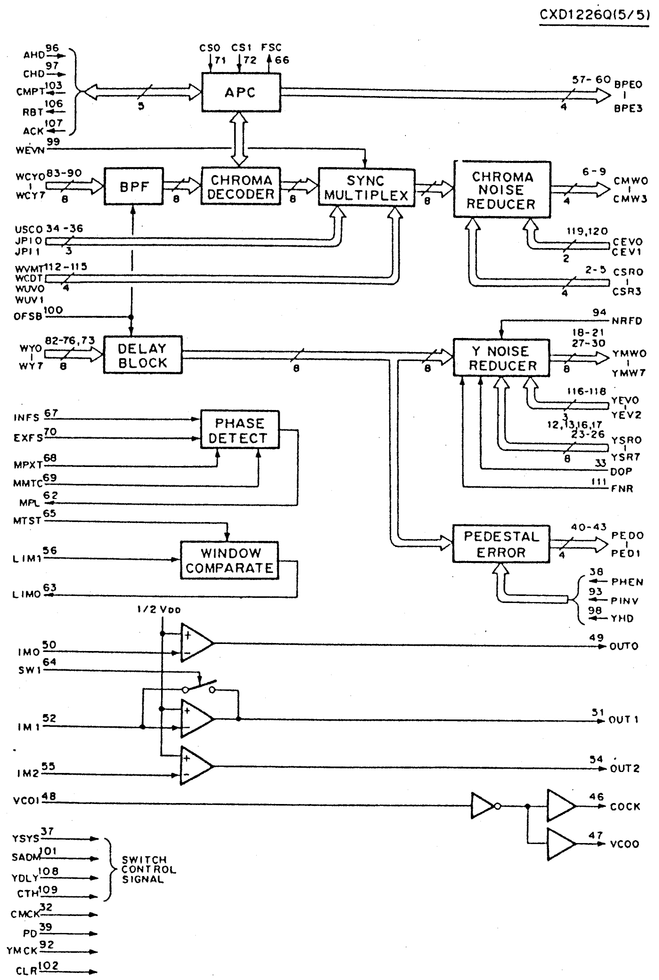
CXD1226Q (SONY) FLAT PACKAGE

C-MOS DIGITAL CHROMA DECODER/Y, C FIELD NOISE REDUCER

- TOP VIEW -

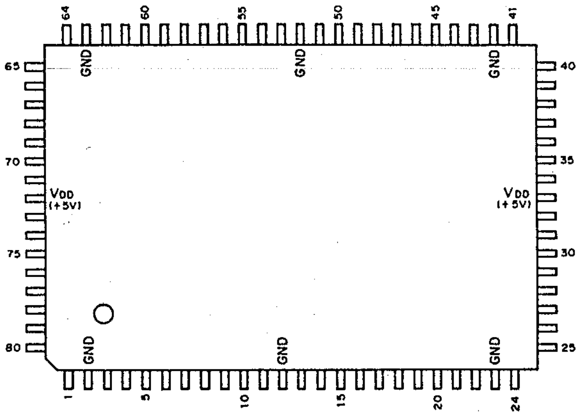

CXD1226Q(1/5)
GND
NC
NC
GND
NC
GND
NC
GND
VDD(+5V)
NC
GND
GND
VDD(+5V)
GND
VDD(+5V)
GND


CXD1226Q(2/5)
82 WY0
81 WY1
80 WY2
79 WY3
78 WY4
77 WY5
76 WY6
73 WY7
99 WEVN
100 OFSB
90 WCY0
89 WCY1
88 WCY2
87 WCY3
86 WCY4
85 WCY5
84 WCY6
83 WCY7
34 USC0
35 JP10
36 JP11
112 WVMT
113 WCDT
114 WUV0
115 WUV1
71 CS0
72 CS1
66 FSC
96 AHD
97 CHD
103 CMPT
106 RBT
107 ACK
50 IM0
52 IM1
55 IM2
64 SW1
48 VCOI
98 YHD
93 PINV
38 PHEN
111 FNR
94 NRFD
33 DOP
116 YEV0
117 YEV1
118 YEV2
12 YSR0
13 YSR1
16 YSR2
17 YSR3
23 YSR4
24 YSR5
25 YSR6
26 YSR7
YMW0 18
YMW1 19
YMW2 20
YMW3 21
YMW4 27
YMW5 28
YMW6 29
YMW7 30
PED0 40
PED1 41
PED2 42
PED3 43
CMW0 6
CMW1 7
CMW2 8
CMW3 9
CEV0 119
CEV1 120
CSR0 2
CSR1 3
CSR2 4
CSR3 5
BPE0 57
BPE1 58
BPE2 59
BPE3 60
OUT0 49
OUT1 51
OUT2 54
COCK 46
VCO0 47
68 MPXT
69 MMTC
67 INFS
70 EXFS
62 MPL
65 MTST
56 LIM1
63 LIM0
37 YSYS
101 SADM
108 YDLY
109 CTH
32 CMCK
39 PD
92 YMCK
102 CLR

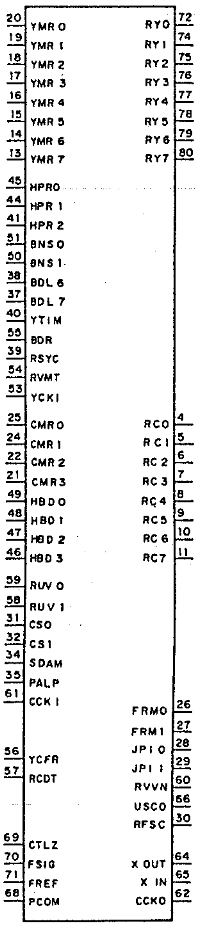

CXD1226Q(5/5)
AHD 96
CHD 97
CMPT 103
RBT 106
ACK 107
WEVN 99
CS0 71
CS1 72
FSC 66
APC
5
57-60 BPE0 ~ BPE3
4
WCY0 83-90 WCY7
8
BPF
CHROMA DECODER
SYNC MULTIPLEX
CHROMA NOISE REDUCER
6-9 CMW0 ~ CMW3
119,120 CEV0 ~ CEV1
2-5 CSR0 ~ CSR3
USC0 34-36
JP10
JP11
3
WVMT 112-115
WCDT
WUV0
WUV1
OFSB 100
WY0 82-76,73 WY7
DELAY BLOCK
Y NOISE REDUCER
94 NRFD
18-21 27-30 YMW0 ~ YMW7
116-118 YEV0 ~ YEV2
12,13,16,17 23-26 YSR0 ~ YSR7
33 DOP
111 FNR
INFS 67
EXFS 70
MPXT 68
MMTC 69
MPL 62
MTST 65
PHASE DETECT
LIM1 56
WINDOW COMPARATE
LIM0 63
PEDESTAL ERROR
40-43 PED0 ~ PED1
38 PHEN
93 PINV
98 YHD
1/2 VDD
IM0 50
SW1 64
IM1 52
IM2 55
49 OUT0
51 OUT1
54 OUT2
VCOI 48
46 COCK
47 VCO0
YSYS 37
SADM 101
YDLY 108
CTH 109
SWITCH CONTROL SIGNAL
CMCK 32
PD 39
YMCK 92
CLR 102

CXD1227Q (SONY)

C-MOS DIGITAL CHROMA ENCODER/VERTICAL ENHANCER
- TOP VIEW -


64
60
55
50
45
41
65
40
70
35
75
30
80
25
1
5
10
15
20
24
GND
GND
GND
GND
GND
GND
VDD (+5V)
VDD (+5V)

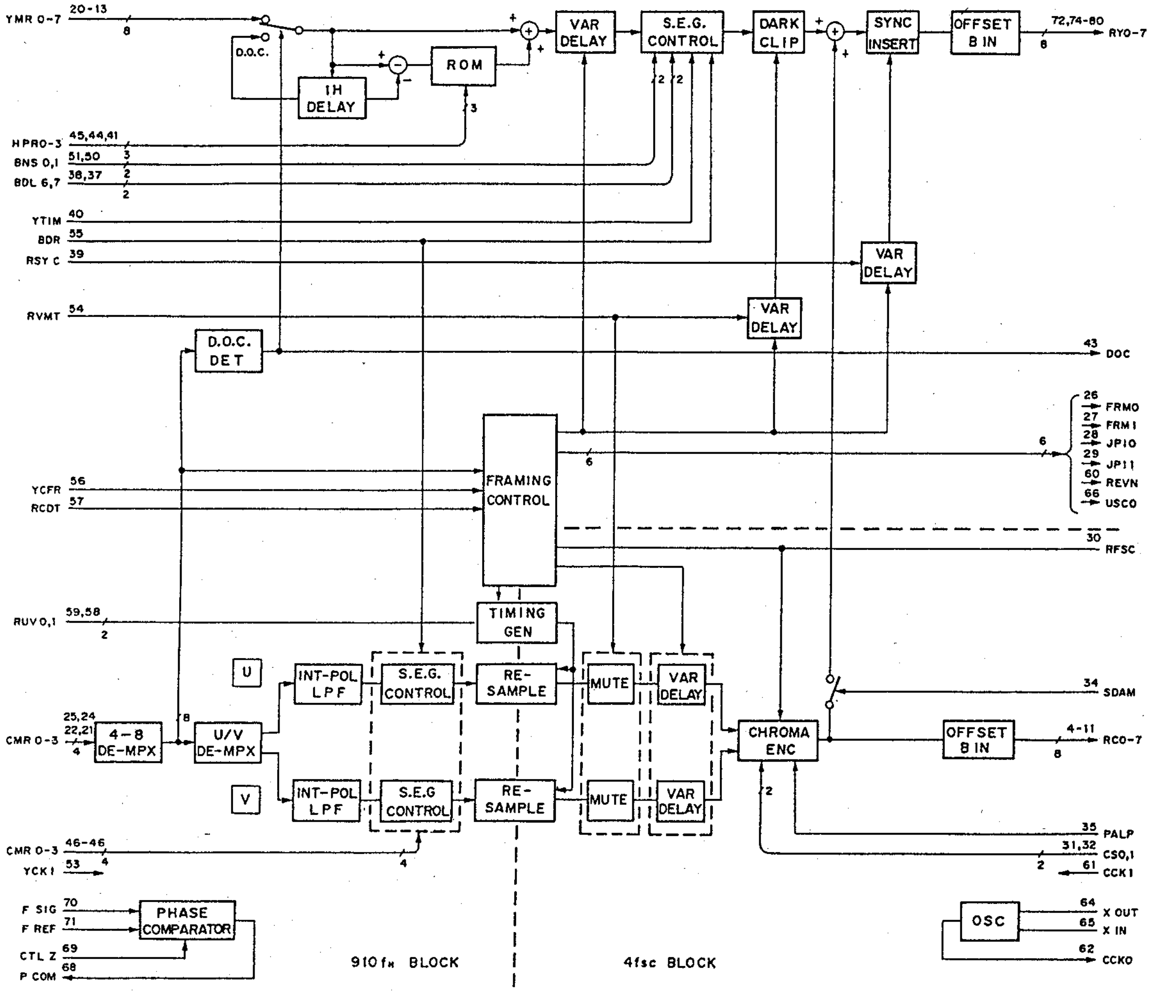
CXD1227Q(1/3)


20 YMR0
19 YMR1
18 YMR2
17 YMR3
16 YMR4
15 YMR5
14 YMR6
13 YMR7
45 HPR0
44 HPR1
41 HPR2
51 BNS0
50 BNS1
38 BDL6
37 BDL7
40 YTIM
55 BDR
39 RSYC
54 RVMT
53 YCKI
25 CMR0
24 CMR1
22 CMR2
21 CMR3
49 HBD0
48 HBD1
47 HBD2
46 HBD3
59 RUV0
58 RUV1
31 CS0
32 CS1
34 SDAM
35 PALP
61 CCKI
56 YCFR
57 RCDT
69 CTLZ
70 FSIG
71 FREF
68 PCOM
RY0 72
RY1 74
RY2 75
RY3 76
RY4 77
RY5 78
RY6 79
RY7 80
RC0 4
RC1 5
RC2 6
RC3 7
RC4 8
RC5 9
RC6 10
RC7 11
FRM0 26
FRM1 27
JPI0 28
JPI1 29
RVVN 60
USCO 66
RFSC 30
X OUT 64
X IN 65
CCKO 62

INPUT
BDR : BORDER TIMING INPUT
*1 BDL6, 7 : Y BORDER LEVEL SELECT INPUTS
*2 BNS0, 1 : SOLORIZATION RESOLUTION SELECT
CCKI : CHROMA CLOCK INPUT (4fsc)
CLRI : CLEAR INPUT
CMR0 - 3 : CHROMA DATA INPUTS
*3 CS0, 1 : CHROMA SYSTEM SELECT INPUTS
CTLZ : PHASE COMPARATOR OUT CONTROL INPUT
FREF : PHASE COMPARATOR REFERRENCE SIGNAL INPUT
FSIG : PHASE COMPARATOR SIGNAL INPUT
*4 HBD0, 1 : U-AXIS BORDER LEVEL INPUTS
*5 HBD2, 3 : V-AXIS BORDER LEVEL INPUTS
*6 HPR0 - 2 : H PROCESS INPUTS
OFSB : OFF SET BINARY MODE INPUT
PALP : PAL PHASE CONTROL INPUT
RCDT : READ FRAMING CODE TIMING INPUT
RSYC : READ SYNC INPUT
RUV0 - 1 : READ U/V TIMING INPUTS
RVMT : READ VIDEO MUTE INPUT
SDAM : D/A MODE SELECT INPUT
XIN : CHROMA CLOCK INPUT FOR OSCILLATOR
YCKI : Y CLOCK INPUT ($910f_H$)
YCFR : Y/C FRAMING ON/OFF SELECT INPUT
YMR0 - 7 : Y DATA INPUTS
YTIM : Y TIMING CONTROL INPUT

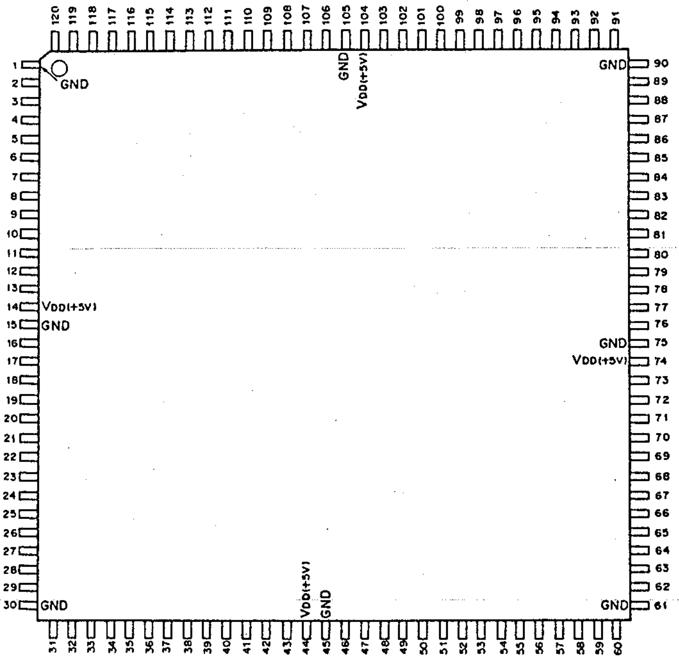
OUTPUT
CCKO : CHROMA CLOCK OSCILLATOR OUTPUT (4fsc)
DOC : DROP OUT CONTROL MONITOR OUTPUT
FRM0, 1 : CHROMA FRAMING CODE OUTPUTS
JPI0, 1 : ID CODE MONITOR OUTPUTS (D2, D3)
PCOM : PHASE COMPARATOR OUTPUT
RC0 - 7 : READ CHROMA D/A OUTPUTS
REVN : READ EVEN/$\overline{\text{ODD}}$ FIELD MONITOR OUTPUT
RFSC : READ fsc OUTPUT
RY0 - 7 : READ Y D/A OUTPUTS
TST0, 1 : TEST TERMINALS
USCO : USER CODE FOR OPTION
XOUT : CHROMA CLOCK OUTPUT FOR OSCILLATOR

CXD1227Q(3/3)

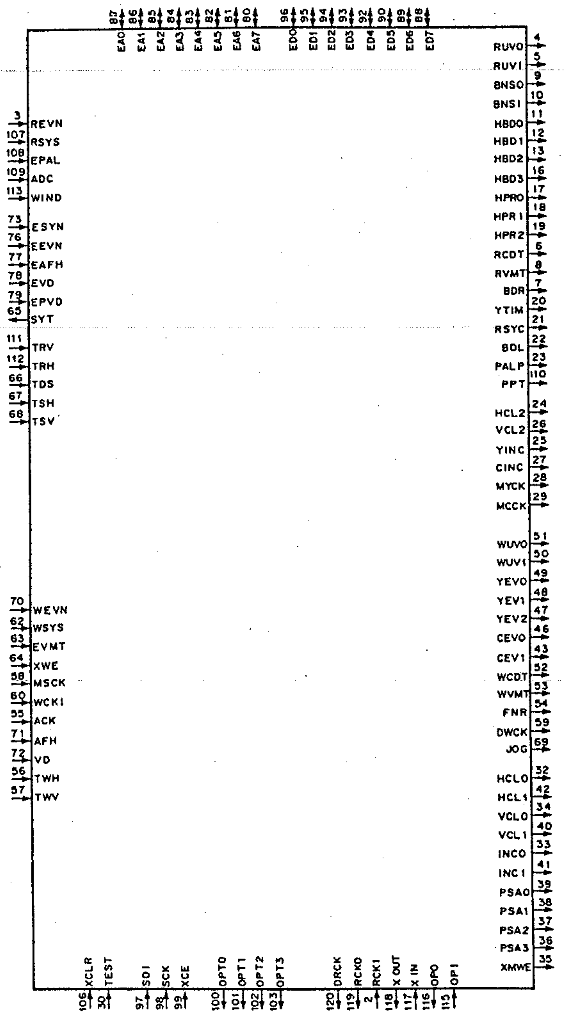

YMR 0-7
20-13
8
D.O.C.
1H DELAY
ROM
VAR DELAY
S.E.G. CONTROL
DARK CLIP
SYNC INSERT
OFFSET B IN
72,74-80
RY0-7
HPR0-3
45,44,41
3
BNS 0,1
51,50
2
BDL 6,7
38,37
2
YTIM 40
BDR 55
RSY C 39
VAR DELAY
RVMT 54
VAR DELAY
D.O.C. DET
43 DOC
FRAMING CONTROL
6
26 FRM0
27 FRM1
28 JPI0
29 JPI1
60 REVN
66 USCO
30 RFSC
YCFR 56
RCDT 57
RUV0,1 59,58
2
TIMING GEN
U
V
INT-POL LPF
S.E.G. CONTROL
RE-SAMPLE
MUTE
VAR DELAY
CHROMA ENC
OFFSET B IN
4-11
RC0-7
34 SDAM
CMR 0-3
25,24 22,21
4
4-8 DE-MPX
8
U/V DE-MPX
CMR 0-3 46-46 4
YCKI 53
4
35 PALP
31,32 CS0,1
61 CCKI
F SIG 70
F REF 71
CTL Z 69
P COM 68
PHASE COMPARATOR
OSC
64 X OUT
65 X IN
62 CCKO
910fH BLOCK
4fsc BLOCK

MB87448A-003 (FUJITSU) FLAT PACKAGE
C-MOS MEMORY ADDRESS CONTROLLER
- TOP VIEW -

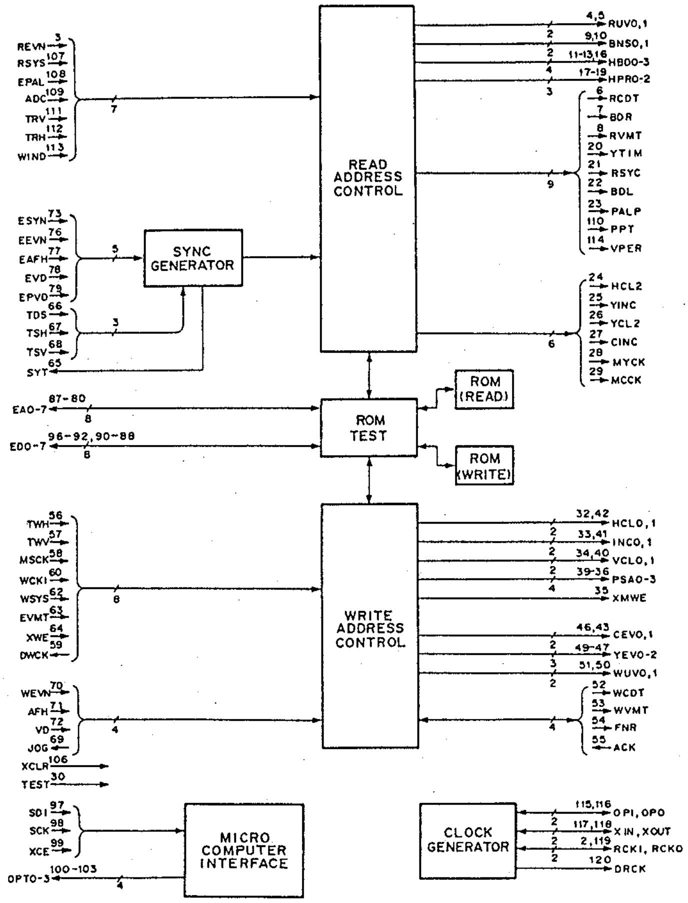
MB87448A-003(1/5)


GND
VDD(+5V)
GND
VDD(+5V)
GND
GND
VDD(+5V)
GND
VDD(+5V)
GND
GND
GND

MB87448A-003(2/5)


EA0
EA1
EA2
EA3
EA4
EA5
EA6
EA7
ED0
ED1
ED2
ED3
ED4
ED5
ED6
ED7
REVN
RSYS
EPAL
ADC
WIND
ESYN
EEVN
EAFH
EVD
EPVD
SYT
TRV
TRH
TDS
TSH
TSV
WEVN
WSYS
EVMT
XWE
MSCK
WCKI
ACK
AFH
VD
TWH
TWV
RUV0
RUV1
BNS0
BNS1
HBD0
HBD1
HBD2
HBD3
HPR0
HPR1
HPR2
RCDT
RVMT
BDR
YTIM
RSYC
BDL
PALP
PPT
HCL2
VCL2
YINC
CINC
MYCK
MCCK
WUV0
WUV1
YEV0
YEV1
YEV2
CEV0
CEV1
WCDT
WVMT
FNR
DWCK
JOG
HCL0
HCL1
VCL0
VCL1
INC0
INC1
PSA0
PSA1
PSA2
PSA3
XMWE
XCLR
TEST
SDI
SCK
XCE
OPT0
OPT1
OPT2
OPT3
DRCK
RCK0
RCKI
X OUT
X IN
OP0
OPI

MB87448A-003(3/5)


REVN
RSYS
EPAL
ADC
TRV
TRH
WIND
ESYN
EEVN
EAFH
EVD
EPVD
TDS
TSH
TSV
SYT
SYNC GENERATOR
READ ADDRESS CONTROL
RUV0,1
BNS0,1
HBD0-3
HPR0-2
RCDT
BDR
RVMT
YTIM
RSYC
BDL
PALP
PPT
VPER
HCL2
YINC
YCL2
CINC
MYCK
MCCK
EA0-7
87-80
ED0-7
96-92,90-88
ROM TEST
ROM (READ)
ROM (WRITE)
TWH
TWV
MSCK
WCKI
WSYS
EVMT
XWE
DWCK
WEVN
AFH
VD
JOG
XCLR
TEST
WRITE ADDRESS CONTROL
HCL0,1
INC0,1
VCL0,1
PSA0-3
XMWE
CEV0,1
YEV0-2
WUV0,1
WCDT
WVMT
FNR
ACK
SDI
SCK
XCE
OPT0-3
100-103
MICRO COMPUTER INTERFACE
CLOCK GENERATOR
OPI,OPO
X IN, XOUT
RCKI, RCKO
DRCK

INPUT
ACK : CLOCK INPUT FOR APC (H : B/W MODE, L : COLOR MODE)
ADC : CHROMA ADDRESS CONTROL INPUT
AFH : AFC H DRIVE INPUT
EAFH : EXTERNAL SYNC MODE H DRIVE INPUT
EEVN : EXTERNAL SYNC MODE EVEN/ODD SELECT INPUT
EPAL : EXTERNAL SYNC MODE PAL COLOR ID INPUT
EPVD : REFERENCE VD
ESYN : EXTERNAL SYNC MODE CHROMA SYNC INPUT
EVD : EXTERNAL SYNC MODE V DRIVE INPUT
EVMT : EXTERNAL VIDEO MUTE INPUT (H : MUTE, L : NORMAL)
MSCK : MASTER CLOCK INPUT
OPI : INVERTER INPUT
RCKI : READ CLOCK INPUT
REVN : READ EVEN/ODD FIELD MONITOR INPUT
RSYS : READ SYNC SELECT INPUT (H : NTSC, L : PAL)
SDI : SERIAL DATA INPUT
SDK : SERIAL CLOCK INPUT
TDS, TRH, TRV, TSH
TST, TSV, TWH, TWV
: TEST PIN
VD : VERTICAL SYNC DETECT INPUT
WCKI : WRITE CLOCK INPUT
WEVN : WRITE EVEN/ODD FIELD MONITOR INPUT
WIND : WINDOW COMPARATOR INPUT FOR V-PLL
WSYS : WRITE SYNC SELECT INPUT (H : NTSC, L : PAL)
XCE : CHIP ENABLE INPUT
XCLR : DIRECT CLEAR INPUT
XIN : CLOCK INPUT
XWE : WRITE ENABLE INPUT

OUTPUT
BDL : Y BORDER LEVEL OUTPUT
BDR : BORDER OUTPUT
*1 BNS0, 1 : SOLARIZATION CONROL OUTPUTS
*2 CEV0, 1 : C NOISE REDUCER MODE SELECT OUTPUTS
CINC : READ PORT CHROMA INCREMENT OUTPUT
DRCK : DELAYED READ CLOCK OUTPUT
DWCK : DELAYED WRITE CLOCK OUTPUT
FNR : NOISE REDUCER ON/OFF CONTROL OUTPUT
*3 HBD0, 1 : U-AXIS BORDER LEVEL OUTPUTS
*4 HBD2, 3 : V-AXIS BORDER LEVEL OUTPUTS
HCL0 : WRITE PORT HORIZONTAL CLEAR OUTPUT
HCL1, 2 : READ PORT HORIZONTAL CLEAR OUTPUTS
*5 HPR0 – HPR2 : H PROCESS OUTPUTS
INC0 : WRITE PORT LINE INCREMENT OUTPUT
INC1 : READ PORT LINE INCREMENT OUTPUT
JOG : REFERENCE CONTROL OUTPUT
MCCK : READ PORT CHROMA CLOCK OUTPUT
MYCK : READ PORT Y CLOCK OUTPUT
OPO : INVERTER OUTPUT
OPT0 – OPT3 : OPTION OUTPUTS
PALP : PAL PHASE CONTROL OUTPUT
PPT : SMALL PICTURE TIMING OUT
PSA0 – PSA3 : WRITE PORT TRANSFER SYNC OUTPUTS
RCDT : READ FRAIMIG CODE TIMING OUTPUT
RCK0 : READ CLOCK OUTPUT
RUV0, 1 : READ U/V TIMING OUTPUTS
RVMT : READ MUTING OUTPUT
SYT : MONITOR PIN FOR TEST
VCL0 : WRITE PORT VERTICAL CLEAR OUTPUT
VCL1, 2 : READ PORT VERTICAL CLEAR OUTPUTS
VPER : V PHASE COMPARATOR OUTPUT
WCDT : WRITE FRAMING CODE TIMING OUTPUT
WUV0, 1 : WRITE U/V TIMING OUTPUTS
WVMT : WRITE VIDEO MUTE OUTPUT
XMWE : WRITE PORT WRITE ENABLE OUTPUT
XOUT : CLOCK OUTPUT
*6 YEV0 – YEV2 : Y NOISE REDUCER MODE SELECT OUTPUTS
YINC : READ PORT Y INCREMENT OUTPUT
YTIM : Y TIMING CONTROL OUTPUT

INPUT/OUTPUT
EA0 – EA7 : ROM TEST TERMINAL INPUTS/OUTPUTS
ED0 – ED7 : ROM TEST TERMINAL INPUTS/OUTPUTS

*1 SOLORIZATION RESOLUTION

INPUTS		OUTPUTS				
BNS0	BNS1	RY0	RY1	RY2	RY3	RY4
0	0	0	0	1	X	X
0	1	0	0	0	1	X
1	0	0	0	0	0	1
1	1	X	X	X	X	X

*2 CHROMA SIGNAL NOISE REDUCER SELECTION

CEV0	CEV1	OPERATION
0	0	NOISE REDUCER (SOFT)
0	1	NOISE REDUCER (MIDDLE)
1	0	NOISE REDUCER (STRONG)
1	1	NO OPERATION

*3 U-AXIS BORDER LEVEL

HBD1	HBD0	LEVEL
0	0	20 IRE
0	1	– 20 IRE
1	0	– 30 IRE
1	1	0 IRE

*4 V-AXIS BORDER LEVEL

HBD3	HBD2	LEVEL
0	0	20 IRE
0	1	– 20 IRE
1	0	– 30 IRE
1	1	0 IRE

*5 H PROCESS MODE SELECTION

HPR2	HPR1	HPR0	OPERATION
0	0	0	V-ENHANCE (SOFT)
0	0	1	V-ENHANCE (SOFT)
0	1	0	V-ENHANCE (MIDDLE)
0	1	1	V-ENHANCE (STRONG)
1	0	0	MIX RATIO H_T:H_P=1:1
1	0	1	MIX RATIO H_T:H_P=1:3
1	1	0	MIX RATIO H_T:H_P=3:1
1	1	1	NO PLAY

0 : LOW LEVEL
1 : HIGH LEVEL

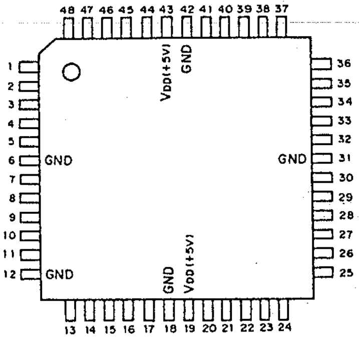
H_T = THROUGH
H_P = 1H DELAY

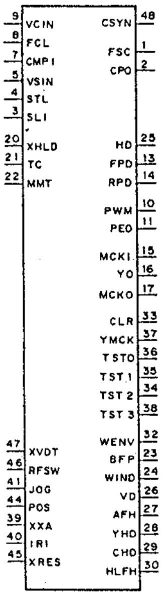
*6 Y SIGNAL NOISE REDUCER SELECTION

YEV0	YEV1	YEV2	OPERATION
0	0	0	NOISE REDUCER (SOFT)
0	0	1	NOISE REDUCER (MIDDLE)
0	1	0	NOISE REDUCER (STRONG)
0	1	1	AFTER IMAGE
1	0	0	VERTICAL FILTER
1	0	1	FADE IN/OUT
1	1	0	SELECT AFTER IMAGE
1	1	1	NO OPERATION

MB87647 (FUJITSU) FLAT PACKAGE

C-MOS AUTOMATIC FREQUENCY CONTROL (AFC) /SYNC SEPARATOR
- TOP VIEW -

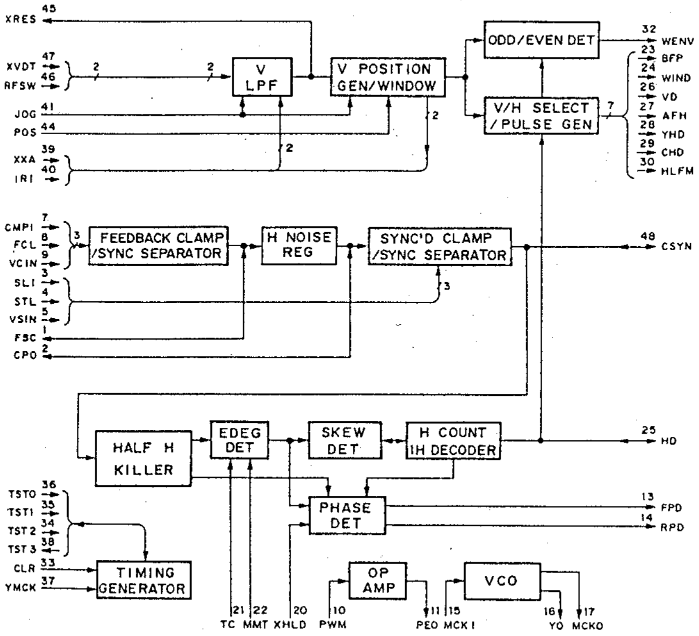

48 47 46 45 44 43 42 41 40 39 38 37
1 2 3 4 5 6 7 8 9 10 11 12
13 14 15 16 17 18 19 20 21 22 23 24
36 35 34 33 32 31 30 29 28 27 26 25
VDD(+5V)
GND
GND
GND
GND
GND
VDD(+5V)


9 VCIN
8 FCL
7 CMPI
5 VSIN
4 STL
3 SLI
20 XHLD
21 TC
22 MMT
47 XVDT
46 RFSW
41 JOG
44 POS
39 XXA
40 IRI
45 XRES
CSYN 48
FSC 1
CPO 2
HD 25
FPD 13
RPD 14
PWM 10
PEO 11
MCKI 15
YO 16
MCKO 17
CLR 33
YMCK 37
TSTO 36
TST1 35
TST2 34
TST3 38
WENV 32
BFP 23
WIND 24
VD 26
AFH 27
YHD 28
CHD 29
HLFH 30

INPUT
CLR : DIRECT CLEAR INPUT
CMPI : FEED BACK CLAMP SLICE LEVEL INPUT
FCL : FEED BACK CLAMP SYNC CHIP LEVEL INPUT
JOG : REFERENCE CONTROL INPUT
MCKI : CLOCK (VCO) INVERTER INPUT
MMT : MONO MULTI TEST PIN (H : NORMAL) INPUT
POS : PHASE REFERENCE SELECT
PWM : OP AMP INPUT
RFSW : RF SW PULSE INPUT
SLI : SYNC CLAMP SLICE LEVEL INPUT
STL : SYNC CLAMP SYNC CHIP LEVEL INPUT
TSTO : L : NORMAL/H : TEST MODE INPUT
TST1, 2 : AFC LOCK PHASE COARSE ADJUST INPUTS
VCIN : FEED BACK CLAMP VIDEO INPUT
VSIN : SYNC CLAMP VIDEO INPUT
XHLD : H : AFC ERROR ACTIVE/L : AFC ERROR HOLD INPUT
XVDT : V-DETECT COMPOSITE SYNC INPUT
YMCK : MASTER CLOCK INPUT

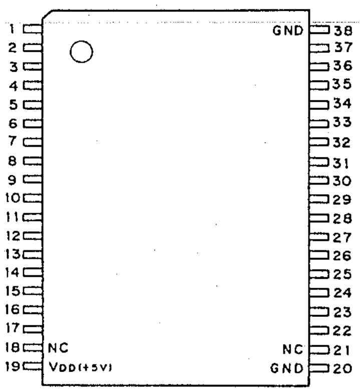
OUTPUT
AFH : AFC H DRIVE OUTPUT
BFP : BURST FLAG PULSE OUTPUT
CHD : H SYNC OUTPUT FOR BURST DETECT
FPD : AFC SUB LOOP PHASE ERROR OUTPUT
HLFH : $1/2f_H$ (≒7.5 kHz) OUTPUT
MCKO : CLOCK (VCO) INVERTER OUTPUT ($910f_H$)
PEO : OP AMP OUTPUT
RPD : AFC MAIN LOOP PHASE ERROR OUTPUT
TST3 : L : NORMAL, H : TEST MODE OUTPUT
VD : VERTICAL SYNC DETECT OUTPUT
WEVN : WRITE EVEN/ODD FIELD DETECT OUTPUT
WIND : WINDOW COMPARATOR OUTPUT FOR V-PLL
XRES : V DETECT LPF OUTPUT
YO : CLOCK (VCO) INVERT OUTPUT
YHD : PEDESTAL CLAMP TIMING OUTPUT

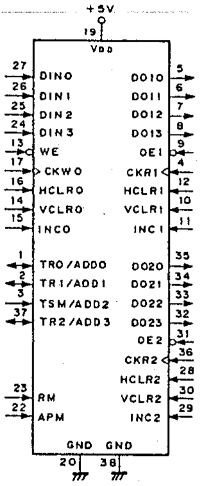
INPUT/OUTPUT
CPO : CLAMP PULSE INPUT/OUTPUT
CSYN : CLAMP SYNC SEPARATE INPUT/OUTPUT
FCS : FEED BACK CLAMP SYNC SEPARATE INPUT/OUTPUT
HD : AFC H DIRECT INPUT/OUTPUT
IR1 : MONITOR PIN FOR TEST INPUT/OUTPUT
TC : AFC LOCK PHASE FINE ADJUST INPUT/OUTPUT
XXA : MONITOR PIN FOR TEST INPUT/OUTPUT


XRES 45
XVDT 47
RFSW 46
2
V LPF
V POSITION GEN/WINDOW
ODD/EVEN DET
V/H SELECT /PULSE GEN
7
32 WENV
23 BFP
24 WIND
26 VD
27 AFH
28 YHD
29 CHD
30 HLFM
JOG 41
POS 44
XXA 39
IRI 40
CMPI 7
FCL 8
VCIN 9
SLI 3
STL 4
VSIN 5
FSC 1
CPO 2
3
FEEDBACK CLAMP /SYNC SEPARATOR
H NOISE REG
SYNC'D CLAMP /SYNC SEPARATOR
48 CSYN
HALF H KILLER
EDEG DET
SKEW DET
H COUNT 1H DECODER
25 HD
PHASE DET
13 FPD
14 RPD
TSTO 36
TST1 35
TST2 34
TST3 38
CLR 33
YMCK 37
TIMING GENERATOR
OP AMP
VCO
21 TC
22 MMT
20 XHLD
10 PWM
11 PEO
15 MCKI
16 YO
17 MCKO

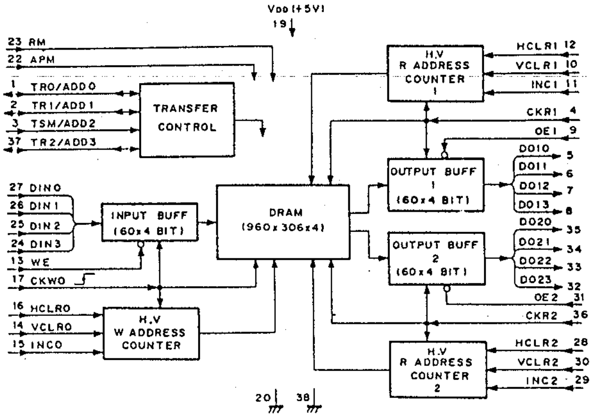
CXK1206M (SONY) FLAT PACKAGE

C-MOS VIDEO FIELD MEMORY (960-COLUMNx306-ROWx4-BIT)
- TOP VIEW -


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
38 37 36 35 34 33 32 31 30 29 28 27 26 25 24 23 22 21 20
GND
NC
VDD(+5V)
NC
GND


+5V
19
VDD
27 DIN0
26 DIN1
25 DIN2
24 DIN3
13 WE
17 CKWO
16 HCLRO
14 VCLRO
15 INCO
1 TRO/ADDO
2 TR1/ADD1
3 TSM/ADD2
37 TR2/ADD3
23 RM
22 APM
DO10 5
DO11 6
DO12 7
DO13 8
OE1 9
CKR1 4
HCLR1 12
VCLR1 10
INC1 11
DO20 35
DO21 34
DO22 33
DO23 32
OE2 31
CKR2 36
HCLR2 28
VCLR2 30
INC2 29
GND GND
20 38

CXK1206M(2/4)

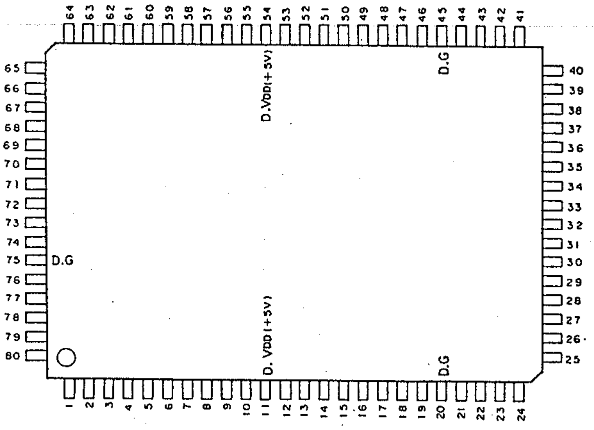

VDD(+5V)
19
23 RM
22 APM
1 TRO/ADDO
2 TR1/ADD1
3 TSM/ADD2
37 TR2/ADD3
TRANSFER CONTROL
27 DINO
26 DIN1
25 DIN2
24 DIN3
13 WE
17 CKWO
INPUT BUFF (60x4 BIT)
DRAM (960x306x4)
16 HCLRO
14 VCLRO
15 INCO
H.V W ADDRESS COUNTER
H.V R ADDRESS COUNTER 1
HCLR1 12
VCLR1 10
INC1 11
CKR1 4
OE1 9
OUTPUT BUFF 1 (60x4 BIT)
DO10 5
DO11 6
DO12 7
DO13 8
OUTPUT BUFF 2 (60x4 BIT)
DO20 35
DO21 34
DO22 33
DO23 32
OE2 31
CKR2 36
H.V R ADDRESS COUNTER 2
HCLR2 28
VCLR2 30
INC2 29
20 38

MODE SELECTION

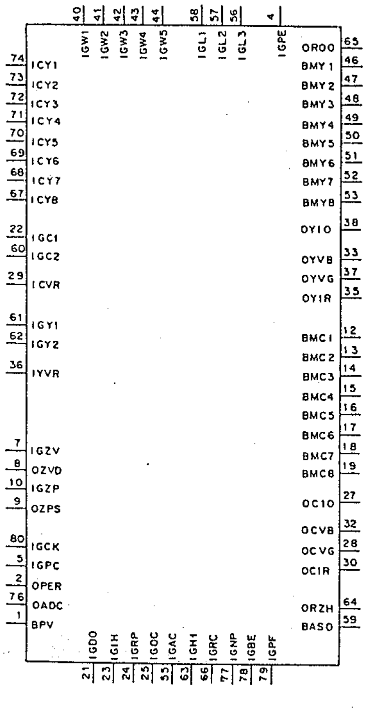
CONTROL INPUTS		TS, TR/ADD			MODE
RM	APM	TSM	TR 0-2	ADD 0-3	
0	0	0	OUT PUT	-	NON RECURSIVE MODE, TRANSFER SYNCHRONOUS MODE OUTPUT
0	0	1	IN-PUT	-	NON RECURSIVE MODE, TRANSFER SYNCHRONOUS MODE INPUT
0	1	-	-	IN-PUT	NON RECURSIVE MODE, ADDRESS PRESET MODE
1	0	0	OUT PUT	-	RECURSIVE MODE, TRANSFER SYNCHRONOUS MODE OUTPUT
1	0	1	IN-PUT	-	RECURSIVE MODE, TRANSFER SYNCHRONOUS MODE INPUT

0:LOW LEVEL 1:HIGH LEVEL

CXD2105AQ(SONY) FLAT PACKAGE
C-MOS DIGITAL COMB FILTER FOR VTR'S
—TOP VIEW—


64 63 62 61 60 59 58 57 56 55 54 53 52 51 50 49 48 47 46 45 44 43 42 41
D.VDD(+5V)
D.G
65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80
D.G
40 39 38 37 36 35 34 33 32 31 30 29 28 27 26 25
D. VDD(+5V)
D.G
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

PIN No.	I/O	SIGNAL	PIN No.	I/O	SIGNAL	PIN No.	I/O	SIGNAL	PIN No.	I/O	SIGNAL
1	I	BPV	21	I	IGD0	41	I	IGW2	61	I	IGY1
2	O	OPER	22	I	IGC1	42	I	IGW3	62	I	IGY2
3	–	A.VDD P	23	I	IGIH	43	I	IGW4	63	I	IGH1
4	I	IGPE	24	I	IGRP	44	I	IGW5	64	O	ORZH
5	I	IGPC	25	I	IGOC	45	–	D.G	65	O	OR00
6	–	A.G P	26	–	A.VDD C	46	I/O	BMY1	66	I	IGRC
7	I	IGZV	27	O	OCIO	47	I/O	BMY2	67	I	IYC8
8	O	OZVD	28	O	OCVG	48	I/O	BMY3	68	I	IYC7
9	O	OZPS	29	–	ICVR	49	I/O	BMY4	69	I	IYC6
10	I	IGZP	30	O	OCIR	50	I/O	BMY5	70	I	IYC5
11	–	D.VDD	31	–	A.G C	51	I/O	BMY6	71	I	IYC4
12	I/O	BMC1	32	O	OCVB	52	I/O	BMY7	72	I	IYC3
13	I/O	BMC2	33	O	OYVB	53	I/O	BMY8	73	I	IYC2
14	I/O	BMC3	34	–	A.G Y	54	–	D.VDD	74	I	IYC1
15	I/O	BMC4	35	O	OYIR	55	I	IGAC	75	–	D.G
16	I/O	BMC5	36	–	IYVR	56	I	IGL3	76	O	OADC
17	I/O	BMC6	37	O	OYVG	57	I	IGL2	77	I	IGNP
18	I/O	BMC7	38	O	OYIO	58	I	IGL1	78	I	IGBE
19	I/O	BMC8	39	–	A.VDD Y	59	I/O	BASO	79	I	IGPF
20	–	D.G	40	I	IGW1	60	I	IGC2	80	I	IGCK

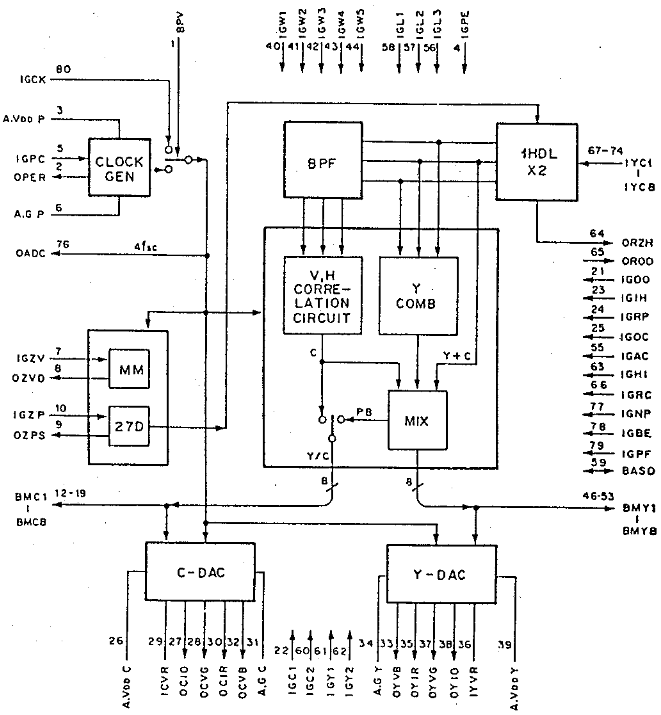

40 IGW1
41 IGW2
42 IGW3
43 IGW4
44 IGW5
58 IGL1
57 IGL2
56 IGL3
4 IGPE
74 ICY1
73 ICY2
72 ICY3
71 ICY4
70 ICY5
69 ICY6
68 ICY7
67 ICY8
22 IGC1
60 IGC2
29 ICVR
61 IGY1
62 IGY2
36 IYVR
7 IGZV
8 OZVD
10 IGZP
9 OZPS
80 IGCK
5 IGPC
2 OPER
76 OADC
1 BPV
OR00 65
BMY1 46
BMY2 47
BMY3 48
BMY4 49
BMY5 50
BMY6 51
BMY7 52
BMY8 53
OYIO 38
OYVB 33
OYVG 37
OYIR 35
BMC1 12
BMC2 13
BMC3 14
BMC4 15
BMC5 16
BMC6 17
BMC7 18
BMC8 19
OCIO 27
OCVB 32
OCVG 28
OCIR 30
ORZH 64
BASO 59
IGDO 21
IGIH 23
IGRP 24
IGOC 25
IGAC 55
IGH1 63
IGRC 66
IGNP 77
IGBE 78
IGPF 79

INPUT
BPV ; EXT/INT CLOCK SELECT
ICVR ; ESTABLISHES MAXIMUM AMPLITUDE VALUE FOR OCIO (PIN 27)
IGAC ; V CORRELATION CIRCUIT ON/OFF
IGBE ; SINGLE WAVE DETECTION ON/OFF (Y/C SEPARATION MODE)
IGC1 ; V CORRELATION CIRCUIT SELECT
IGC2 ; CHROMA FLAT SECTION HORIZONTAL FILTER SELECT (Y/C SEPARATION MODE)
IGCK ; EXTERNAL CLOCK
IGD0 ; DROPOUT CORRECTION
IGH1 ; FLAT SECTION HORIZONTAL FILTER SELECT (Y/C SEPARATION MODE)
IGIH ; SLEW MODE SET
IGL1 – IGL3 ; LIMITER LEVEL ADJUST FOR Y SIGNAL COMB FILTER
IGNP ; NTSC/PAL FORMAT SELECT
IGOC ; OUTPUT ENABLE
IGPC ; VCO CONTROL
IGPE ; TEST
IGPF ; PLL SUBCARRIER
IGRC ; DELAY LINE LENGTH ADJUST
IGRP ; Y/C SEPARATION AND PLAYBACK MODE SELECT
IGW1 – IGW5 ; Y COMB FILTER DEPTH ADJUST
IGY1, IGY2 ; EDGE SECTION HORIZONTAL FILTER SELECT (Y/C SEPARATION MODE)
IGZP ; 1-BIT DELAY CIRCUIT
IGZV ; VCR HEAD SWITCHING
IYC1 – IYC8 ; VIDEO SIGNAL
IYVR ; ESTABLISHES MAXIMUM AMPLITUDE VALUE FOR OYIO (PIN 38)

OUTPUT
OADC ; CLOCK
OCIO ; CHROMA ANALOG SIGNAL
OCIR ; CONNECT A RESISTOR 16x LARGE THAN THE RESISTOR AT OCIO (PIN 27)
OCVB ; CONNECT TO DIGITAL GND WHICH HAS A CAPACITANCE OF UP TO 0.1 μF
OCVG ; CONNECT TO AN ANALOG POWER SUPPLY WHICH HAS A CAPACITANCE OF UP TO 0.1 μF
OPER ; PLL ERROR
OR00 ; "0" IS DETECTED AT ALL INPUTS
ORZH ; 1-BIT DELAY CIRCUIT
OYIO ; Y ANALOG SIGNAL
OYIR ; CONNECT A RESISTOR 16x LARGE THAN THE RESISTOR AT OYIO (PIN 38)
OYVB ; CONNECT TO DIGITAL GND WHICH HAS A CAPACITANCE OF UP TO 0.1 μF
OYVG ; CONNECT TO AN ANALOG POWER SUPPLY WHICH HAS A CAPACITANCE OF UP TO 0.1 μF
OZPS ; 1-BIT DELAY CIRCUIT
OZVD ; VSYNC PERIOD MASK

INPUT/OUTPUT
BASO ; EDGE DETECTION LEVEL SELECT (Y/C SEPARATION MODE)
BMC1 – BMC8 ; CHROMA DIGITAL SIGNAL
BMY1 – BMY8 ; Y DIGITAL SIGNAL

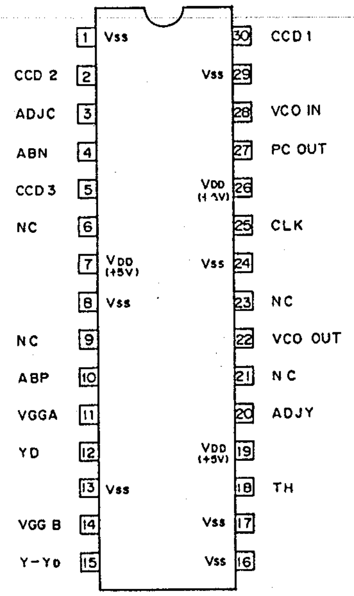
OTHER
A.G C ; ANALOG GND FOR CHROMA D/A
A.G P ; ANALOG GND FOR VCO
A.G Y ; ANALOG GND FOR Y D/A
A.VDD C ; ANALOG POWER SUPPLY FOR CHROMA D/A
A.VDD P ; ANALOG POWER SUPPLY FOR VCO
A.VDD Y ; ANALOG POWER SUPPLY FOR Y D/A
D.G ; DIGITAL GND
D.VDD ; POWER SUPPLY FOR DIGITAL


BPV 1
IGW1 IGW2 IGW3 IGW4 IGW5
40 41 42 43 44
IGL1 IGL2 IGL3
58 57 56
IGPE 4
IGCK 80
A.VDD P 3
IGPC 5
OPER 2
CLOCK GEN
A.G P 6
OADC 76
4fsc
BPF
1HDL X2
67-74 IYC1 IYC8
V,H CORRE-LATION CIRCUIT
Y COMB
C
Y+C
PB
MIX
Y/C
MM
27D
IGZV 7
OZVD 8
IGZP 10
OZPS 9
64 ORZH
65 OR00
21 IGD0
23 IGIH
24 IGRP
25 IGOC
55 IGAC
63 IGH1
66 IGRC
77 IGNP
78 IGBE
79 IGPF
59 BASO
8
8
BMC1 BMC8 12-19
46-53 BMY1 BMY8
C-DAC
Y-DAC
26 A.VDD C
29 ICVR
27 OCIO
28 OCVG
30 OCIR
32 OCVB
31 A.G C
22 IGC1
60 IGC2
61 IGY1
62 IGY2
34 A.G Y
33 OYVB
35 OYIR
37 OYVG
38 OYIO
36 IYVR
39 A.VDD Y

CXL1501M (SONY)

C-MOS CCD SIGNAL PROCESSER

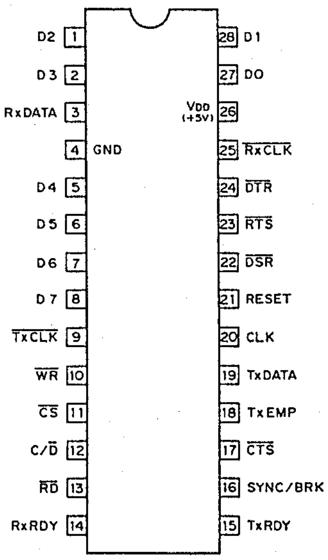
- TOP VIEW -


1 Vss
2 CCD 2
3 ADJC
4 ABN
5 CCD 3
6 NC
7 VDD (+5V)
8 Vss
9 NC
10 ABP
11 VGGA
12 YD
13 Vss
14 VGG B
15 Y-YD
16 Vss
17 Vss
18 TH
19 VDD (+5V)
20 ADJY
21 NC
22 VCO OUT
23 NC
24 Vss
25 CLK
26 VDD (+5V)
27 PC OUT
28 VCO IN
29 Vss
30 CCD 1

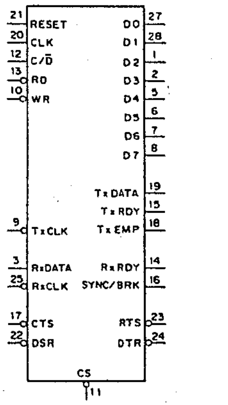
CXQ71051P (SONY)

C-MOS SERIAL CONTROL UNIT

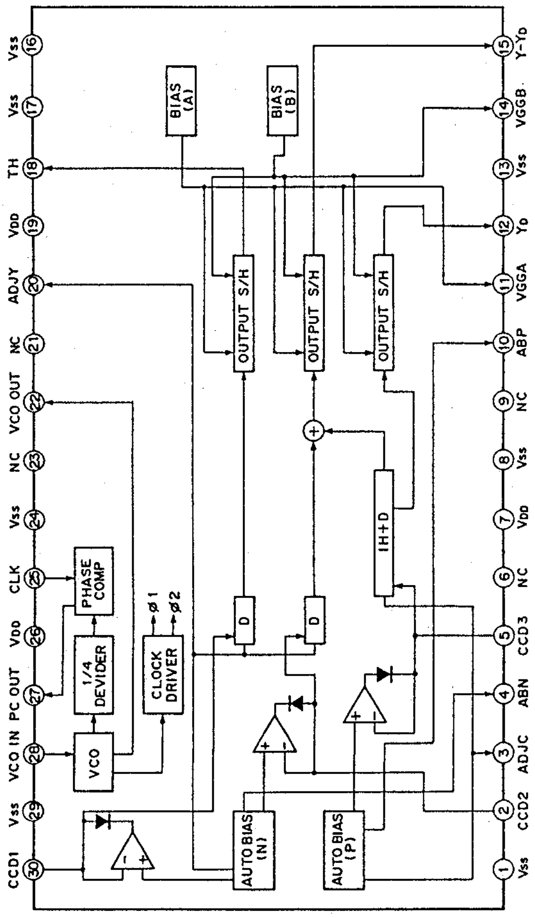
- TOP VIEW -

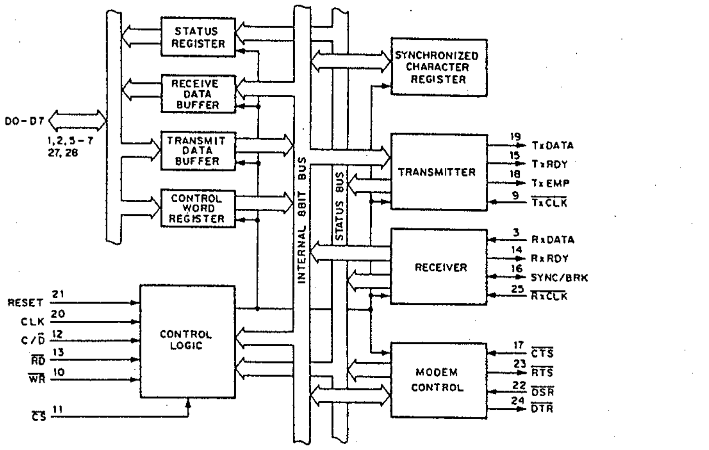

1 D2
2 D3
3 RxDATA
4 GND
5 D4
6 D5
7 D6
8 D7
9 TxCLK
10 WR
11 CS
12 C/D
13 RD
14 RxRDY
15 TxRDY
16 SYNC/BRK
17 CTS
18 TxEMP
19 TxDATA
20 CLK
21 RESET
22 DSR
23 RTS
24 DTR
25 RxCLK
26 VDD (+5V)
27 D0
28 D1

CXQ71051P(1/2)


21 RESET
20 CLK
12 C/D
13 RD
10 WR
D0 27
D1 28
D2 1
D3 2
D4 5
D5 6
D6 7
D7 8
TxDATA 19
TxRDY 15
TxEMP 18
9 TxCLK
3 RxDATA
25 RxCLK
RxRDY 14
SYNC/BRK 16
17 CTS
22 DSR
RTS 23
DTR 24
CS 11

CLK	:CLOCK
CS	:CHIP SELECT
CTS	:CLEAR TO SEND
C/D	:CONTROL OR DATA
D0-7	:DATA BUS
DSR	:DATA SET READY
DTR	:DATA TERMINAL READY
RD	:READ STROBE
RESET	:RESET
RTS	:REQUEST TO SEND
RXCLK	:RECEIVER CLOCK
RXDATA	:RECEIVE DATA
RXRDY	:RECEIVER READY
SYNC/BRK	:SYNCRONIZATION/BREAK
TXCLK	:TRANSMITTER CLOCK
TXDATA	:TRANSMIT DATA
TXEMP	:TRANSMITTER EMPTY
TXRDY	:TRANSMITTER READY
WR	:WRITE STROBE

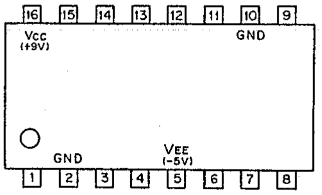

Vss 16
Vss 17
TH 18
VDD 19
ADJY 20
NC 21
VCO OUT 22
NC 23
Vss 24
CLK 25
VDD 26
PC OUT 27
VCO IN 28
Vss 29
CCD1 30
15 Y-YD
14 VGGB
13 Vss
12 YD
11 VGGA
10 ABP
9 NC
8 Vss
7 VDD
6 NC
5 CCD3
4 ABN
3 ADJC
2 CCD2
1 Vss
BIAS (A)
BIAS (B)
OUTPUT S/H
OUTPUT S/H
OUTPUT S/H
+
1H+D
D
D
PHASE COMP
1/4 DEVIDER
CLOCK DRIVER
ø1
ø2
VCO
AUTO BIAS (N)
AUTO BIAS (P)

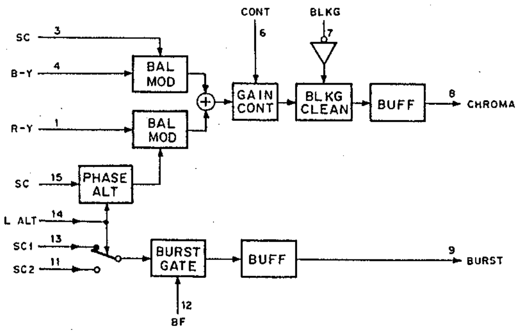

STATUS REGISTER
RECEIVE DATA BUFFER
TRANSMIT DATA BUFFER
CONTROL WORD REGISTER
SYNCHRONIZED CHARACTER REGISTER
D0-D7
1,2,5-7 27,28
INTERNAL 8BIT BUS
STATUS BUS
TRANSMITTER
19 TxDATA
15 TxRDY
18 TxEMP
9 TxCLK
RECEIVER
3 RxDATA
14 RxRDY
16 SYNC/BRK
25 RxCLK
MODEM CONTROL
17 CTS
23 RTS
22 DSR
24 DTR
CONTROL LOGIC
RESET 21
CLK 20
C/D 12
RD 13
WR 10
CS 11

CS	RD	WR	C/D	MODE	FUNCTION
0	0	1	0	RECEIVE DATA BUFFER--> DATA BUS	READ RECEIVE DATA
0	0	1	1	STATUS REGISTER--> DATA BUS	READ STATUS
0	1	0	0	DATA BUS--> TRANSMIT DATA BUFFER	WRITE RECEIVE DATA
0	1	0	1	DATA BUS--> CONTROL WORD REGISTER	WRITE CONTROL WORD
0	1	1	X	DATA BUS:HIGH IMPEDANCE	
1	X	X	X	DATA BUS:HIGH IMPEDANCE	

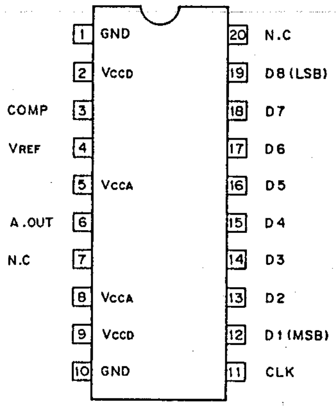
1:HIGH LEVEL
0:LOW LEVEL
X:DON'T CARE

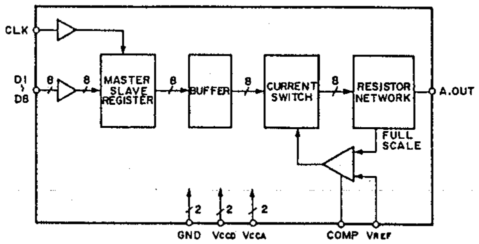
CX22017 (SONY)
VIDEO SIGNAL PROCESSOR
— TOP VIEW —


16
15
14
13
12
11
10
9
Vcc (+9V)
GND
GND
VEE (-5V)
1
2
3
4
5
6
7
8

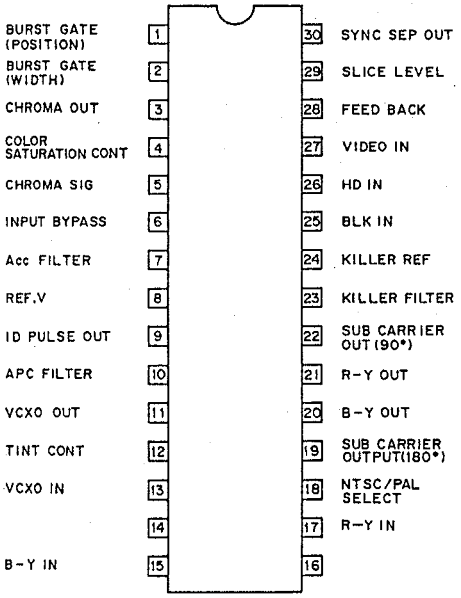

SC 3
B-Y 4
R-Y 1
SC 15
L ALT 14
SC1 13
SC2 11
BAL MOD
BAL MOD
PHASE ALT
CONT 6
BLKG 7
GAIN CONT
BLKG CLEAN
BUFF
8 CHROMA
BURST GATE
BUFF
9 BURST
12 BF

MB40778PF (FUJITSU)
BIPOLAR D/A CONVERTER
- TOP VIEW -

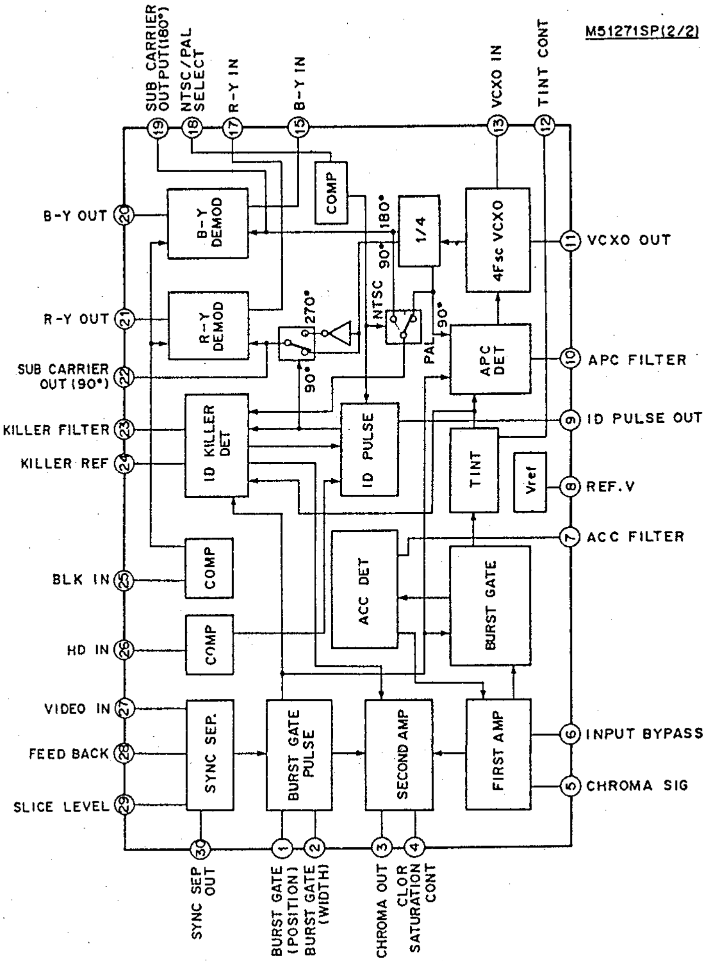

1 GND
2 VCCD
COMP 3
VREF 4
5 VCCA
A.OUT 6
N.C 7
8 VCCA
9 VCCD
10 GND
20 N.C
19 D8 (LSB)
18 D7
17 D6
16 D5
15 D4
14 D3
13 D2
12 D1 (MSB)
11 CLK


CLK
D1 ~ D8
8
MASTER SLAVE REGISTER
BUFFER
CURRENT SWITCH
RESISTOR NETWORK
A.OUT
FULL SCALE
2
GND
VCCD
VCCA
COMP
VREF

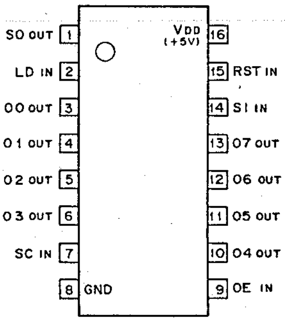
M51271SP (MITSUBISHI) FLAT PACKAGE
NTSC, PAL CHROMA DECODER
- TOP VIEW -

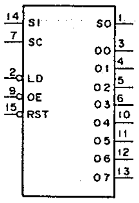

BURST GATE (POSITION) 1
BURST GATE (WIDTH) 2
CHROMA OUT 3
COLOR SATURATION CONT 4
CHROMA SIG 5
INPUT BYPASS 6
Acc FILTER 7
REF.V 8
ID PULSE OUT 9
APC FILTER 10
VCXO OUT 11
TINT CONT 12
VCXO IN 13
14
B-Y IN 15
30 SYNC SEP OUT
29 SLICE LEVEL
28 FEED BACK
27 VIDEO IN
26 HD IN
25 BLK IN
24 KILLER REF
23 KILLER FILTER
22 SUB CARRIER OUT (90°)
21 R-Y OUT
20 B-Y OUT
19 SUB CARRIER OUTPUT(180°)
18 NTSC/PAL SELECT
17 R-Y IN
16

M51271SP(2/2)

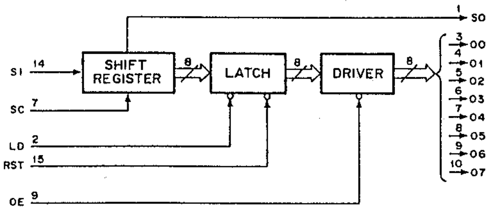

SUB CARRIER OUTPUT(180°) 19
NTSC/PAL SELECT 18
R-Y IN 17
B-Y IN 15
VCXO IN 13
TINT CONT 12
B-Y OUT 20
R-Y OUT 21
SUB CARRIER OUT (90°) 22
KILLER FILTER 23
KILLER REF 24
BLK IN 25
HD IN 26
VIDEO IN 27
FEED BACK 28
SLICE LEVEL 29
11 VCXO OUT
10 APC FILTER
9 ID PULSE OUT
8 REF.V
7 ACC FILTER
6 INPUT BYPASS
5 CHROMA SIG
B-Y DEMOD
R-Y DEMOD
COMP
1/4
4Fsc VCXO
180°
90°
270°
NTSC
PAL
APC DET
ID KILLER DET
ID PULSE
TINT
Vref
COMP
COMP
ACC DET
BURST GATE
SYNC SEP.
BURST GATE PULSE
SECOND AMP
FIRST AMP
30 SYNC SEP OUT
1 BURST GATE (POSITION)
2 BURST GATE (WIDTH)
3 CHROMA OUT
4 CLOR SATURATION CONT

MB88306PF (FUJITSU) FLAT PACKAGE
C-MOS OUTPUT EXPANDER
– TOP VIEW –

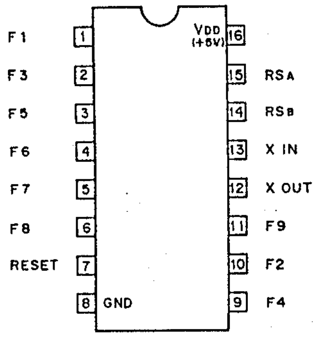

SO OUT 1
LD IN 2
O0 OUT 3
O1 OUT 4
O2 OUT 5
O3 OUT 6
SC IN 7
8 GND
VDD (+5V) 16
15 RST IN
14 SI IN
13 O7 OUT
12 O6 OUT
11 O5 OUT
10 O4 OUT
9 OE IN

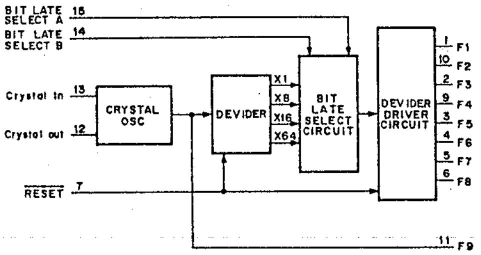

14 SI
7 SC
2 LD
9 OE
15 RST
SO 1
O0 3
O1 4
O2 5
O3 6
O4 10
O5 11
O6 12
O7 13

LD ; DATA LOAD INPUT
O0 – O7 ; 8 BIT PARALLEL OUTPUT PROT
OE ; OUTPUT ENABLE INPUT
RST ; RESET INPUT
SC ; SHIFT CLOCK INPUT
SI ; SERIAL DATA INPUT
SO ; SERIAL DATA OUTPUT


SI 14
SC 7
LD 2
RST 15
OE 9
SHIFT REGISTER
8
LATCH
8
DRIVER
8
1 SO
3 O0
4 O1
5 O2
6 O3
7 O4
8 O5
9 O6
10 O7

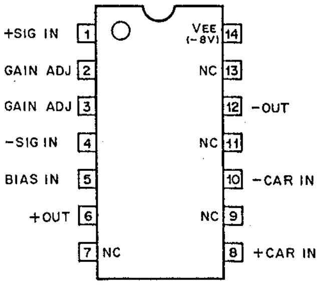
MC145411P (MOTOROLA)
C-MOS BIT LATE GENERATER
– TOP VIEW –


F1 1
F3 2
F5 3
F6 4
F7 5
F8 6
RESET 7
8 GND
VDD (+5V) 16
15 RSA
14 RSB
13 X IN
12 X OUT
11 F9
10 F2
9 F4

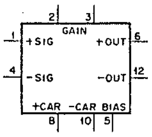

BIT LATE SELECT A 15
BIT LATE SELECT B 14
Crystal in 13
Crystal out 12
RESET 7
CRYSTAL OSC
DEVIDER
X1
X8
X16
X64
BIT LATE SELECT CIRCUIT
DEVIDER DRIVER CIRCUIT
1 F1
10 F2
2 F3
9 F4
3 F5
4 F6
5 F7
6 F8
11 F9

RESET "0" ······ OUTPUT F1 – F8 : "0"
OUTPUT F9 : "1"

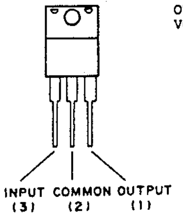
MC1496M (MOTOROLA) FLAT PACKAGE
BALANCED MODULATOR/DEMODULATOR
– TOP VIEW –


+SIG IN 1
GAIN ADJ 2
GAIN ADJ 3
–SIG IN 4
BIAS IN 5
+OUT 6
7 NC
VEE (–8V) 14
NC 13
12 –OUT
NC 11
10 –CAR IN
NC 9
8 +CAR IN

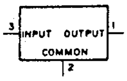
MC1496P


2
3
GAIN
1 +SIG
+OUT 6
4 –SIG
–OUT 12
+CAR –CAR BIAS
8
10
5

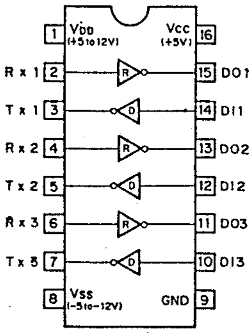
RC7809FA (RAYTHEON)
POSITIVE VOLTAGE REGULATOR
– FRONT VIEW –

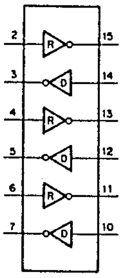

INPUT (3)
COMMON (2)
OUTPUT (1)

OUTPUT VOLTAGE	NJM78M??FA	NJM78??FA	RC78M??FA	RC78??FA
+5V	NJM78M05FA	NJM7805FA	RC78M05FA	RC7805FA
+6V	NJM78M06FA	NJM7806FA	RC78M06FA	RC7806FA
+8V	NJM78M08FA	NJM7808FA	----------	RC7808FA
+9V	NJM78M09FA	NJM7809FA	RC78M09FA	RC7809FA
+12V	NJM78M12FA	NJM7812FA	RC78M12FA	RC7812FA
+15V	NJM78M15FA	NJM7815FA	RC78M15FA	RC7815FA
+18V	NJM78M18FA	NJM7818FA	----------	RC7818FA
+20V	NJM78M20FA	NJM7820FA	----------	RC7820FA
+24V	NJM78M24FA	NJM7824FA	----------	RC7824FA


3
INPUT
OUTPUT
1
COMMON
2

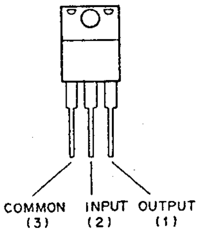
MC145406F (MOTOROLA) FLAT PACKAGE
MC145406P (MOTOROLA)
RS-232-C/V.28 DRIVER/RECEIVER
– TOP VIEW –

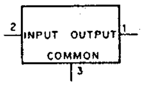

1 VDD (+5to12V)
Rx1 2
Tx1 3
Rx2 4
Tx2 5
Rx3 6
Tx3 7
8 VSS (–5to–12V)
VCC (+5V) 16
15 DO1
14 DI1
13 DO2
12 DI2
11 DO3
10 DI3
GND 9
R
D


2
3
4
5
6
7
15
14
13
12
11
10
R
D

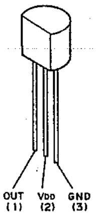
D; DRIVER
R; RECEIVER

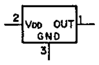
RC7905FA (RAYTHEON) – 5V
RC7909FA (RAYTHEON) – 9V
NEGATIVE VOLTAGE REGULATOR
– FRONT VIEW –


COMMON (3)
INPUT (2)
OUTPUT (1)

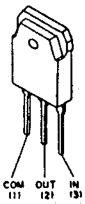

2
INPUT
OUTPUT
1
COMMON
3

S-8051ANR (SEIKO I AND E) 1.10V ~ 1.20V
C-MOS VOLTAGE DETECTOR

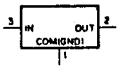

OUT
(1)
VDD
(2)
GND
(3)


2
VDD
OUT
1
GND
3

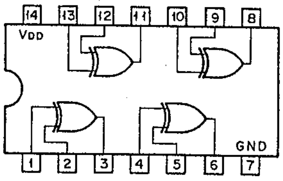
SI-3052V(SANKEN)
SI-3122V(SANKEN)
SI-3522V
SI-3922V
POSITIVE VOLTAGE REGULATOR (2A)

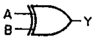

COM
(1)
OUT
(2)
IN
(3)

5V SI-3052V
12V SI-3122V


3
IN
OUT
2
COM(GND)
1

SN74HC86ANS (TI) FLAT PACKAGE
TC74HC86AF (TOSHIBA) FLAT PACKAGE
C-MOS QUAD EXCLUSIVE OR GATES
- TOP VIEW -


14
13
12
11
10
9
8
VDD
GND
1
2
3
4
5
6
7



$Y = \bar{A} \cdot B + A \cdot \bar{B}$

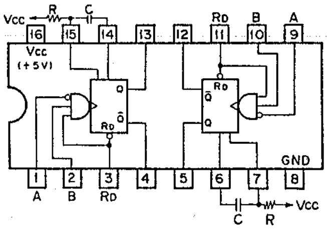
A	B	Y
0	0	0
0	1	1
1	0	1
1	1	0

0; LOW LEVEL
1; HIGH LEVEL

NOTE :

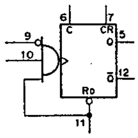
TYPE	VDD
TC74AC86 TYPE	+2 to +5.5V
OTHER TYPES	+2 to +6V

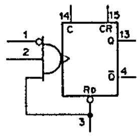
SN74LS123NS (TI) FLAT PACKAGE
TTL RETRIGGERABLE MONOSTABLE MULTIVIBRATOR WITH DIRECT RESET
— TOP VIEW —


Vcc
R
C
RD
B
A
16
15
14
13
12
11
10
9
Vcc
(+5V)
Q
Q̄
RD
GND
1
2
3
4
5
6
7
8
A
B
RD
C
R
Vcc

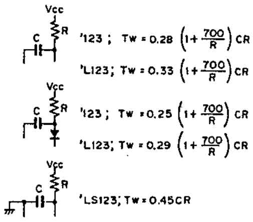
INPUTS			OUTPUTS	
RD	A	B	Q	Q̄
0	X	X	0	1
X	1	X	0	1
X	X	0	0	1
1	0	↑	⊓	⊔
1	↓	1	⊓	⊔
↑	0	1	⊓	⊔

0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE


6
7
9
10
C
CR
5
Q
Q̄
12
RD
11


14
15
1
2
C
CR
13
Q
Q̄
4
RD
3

OUTPUT PULSE WIDTH



'123 ; $T_W = 0.28 \left(1 + \frac{700}{R}\right) CR$

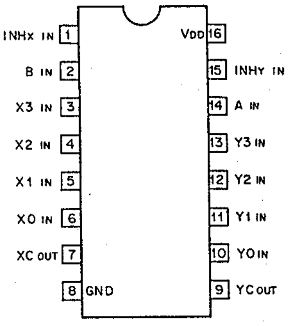
'L123; $T_W = 0.33 \left(1 + \frac{700}{R}\right) CR$

'123 ; $T_W = 0.25 \left(1 + \frac{700}{R}\right) CR$

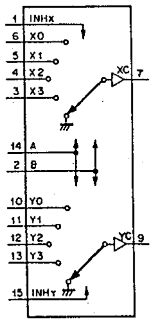
'L123; $T_W = 0.29 \left(1 + \frac{700}{R}\right) CR$

'LS123; $T_W = 0.45CR$

SN74HC153AN (TI)
TC74AC153P (TOSHIBA)
C-MOS DUAL 4-LINE-TO-1-LINE DATA SELECTOR/MULTIPLEXER
- TOP VIEW -


INHx IN 1
B IN 2
X3 IN 3
X2 IN 4
X1 IN 5
X0 IN 6
XC OUT 7
8 GND
VDD 16
15 INHY IN
14 A IN
13 Y3 IN
12 Y2 IN
11 Y1 IN
10 Y0 IN
9 YC OUT

TC74HC153P

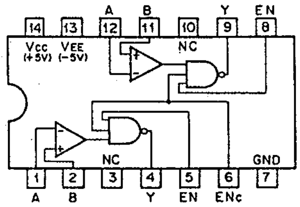

1 INHx
6 X0
5 X1
4 X2
3 X3
XC 7
14 A
2 B
10 Y0
11 Y1
12 Y2
13 Y3
YC 9
15 INHY

TYPE	VDD
EXCEPT FOL. TYPE	+2 to +6V
74ACT153PC 74ACT153SJ	+5V
TC74AC153P	+2 to +5.5V

CONTROL IN			ON CHANNEL
INH	B	A	
0	0	0	0
0	0	1	1
0	1	0	2
0	1	1	3
1	X	X	GND

0 ; LOW LEVEL
1 ; HIGH LEVEL
X ; DON'T CARE

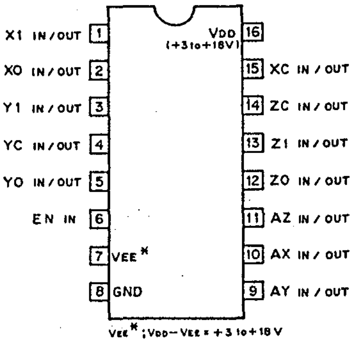
SN75207BNS (TI)
BIPOLAR LINE RECEIVER (TTL COMPATIBLE)
- TOP VIEW -

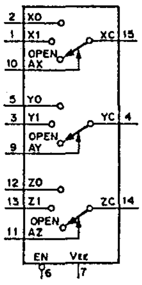

A
B
Y
EN
14
13
12
11
10
9
8
Vcc
(+5V)
VEE
(-5V)
NC
NC
GND
1
2
3
4
5
6
7
A
B
Y
EN
ENc

INPUTS			OUT
B - A	EN	ENc	Y
B - A ≧ 10mV	X	0	1
	0	X	1
	1	1	0
|B - A| < 10mV	X	0	1
	0	X	1
	1	1	*
B - A ≦ -10mV	X	X	1

0 ; LOW LEVEL
1 ; HIGH LEVEL
X ; DON'T CARE
* ; INDETERMINATE

TC4053BFHB (TOSHIBA) FLAT PACKAGE
C-MOS TRIPLE 2-CHANNEL ANALOG MULTIPLEXER/DEMULTIPLEXER
– TOP VIEW –

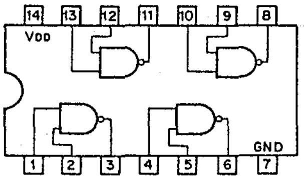

X1 IN/OUT 1
X0 IN/OUT 2
Y1 IN/OUT 3
YC IN/OUT 4
Y0 IN/OUT 5
EN IN 6
7 VEE*
8 GND
VDD (+3 to +18V) 16
15 XC IN/OUT
14 ZC IN/OUT
13 Z1 IN/OUT
12 Z0 IN/OUT
11 AZ IN/OUT
10 AX IN/OUT
9 AY IN/OUT
VEE*; VDD−VEE = +3 to+18 V

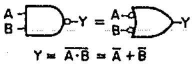

X0
X1
OPEN
AX
XC
Y0
Y1
OPEN
AY
YC
Z0
Z1
OPEN
AZ
ZC
EN
VEE

CONT. INPUTS		ON CHANNEL
EN	A (X,Y,Z,)	
0	0	0
0	1	1
1	X	OPEN

0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE.

TC74HC00AF (TOSHIBA) FLAT PACKAGE
C-MOS QUAD 2-INPUT NAND GATE
– TOP VIEW –


14 13 12 11 10 9 8
VDD
GND
1 2 3 4 5 6 7



$Y = \overline{A \cdot B} = \overline{A} + \overline{B}$

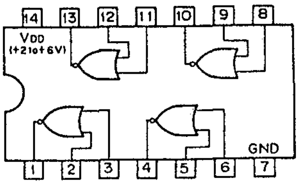
A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

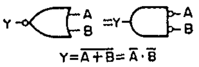
0; LOW LEVEL
1; HIGH LEVEL

NOTE :

TYPE	VDD
TC74AC00P	+2V to +5.5V
MC74HCT00N	+5V
OTHER TYPES	+2V to +6V

TC74HC02AF (TOSHIBA)
C-MOS QUAD 2-INPUT NOR GATE
– TOP VIEW –


14 13 12 11 10 9 8
VDD (+2 to +6V)
GND
1 2 3 4 5 6 7

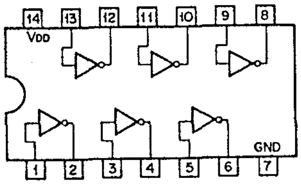


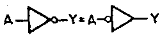
$Y = \overline{A + B} = \overline{A} \cdot \overline{B}$

A	B	Y
0	0	1
0	1	0
1	0	0
1	1	0

0: LOW LEVEL
1: HIGH LEVEL

TC74HC04AF (TOSHIBA) FLAT PACKAGE
C-MOS HEX INVERTER
– TOP VIEW –


14 13 12 11 10 9 8
VDD
GND
1 2 3 4 5 6 7

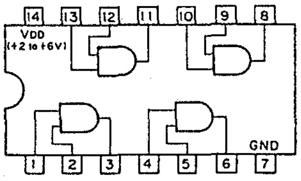


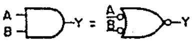
$Y = \overline{A}$

A	Y
0	1
1	0

0: LOW LEVEL
1: HIGH LEVEL

TC74HC08AF (TOSHIBA) FLAT PACKAGE
C-MOS QUAD 2-INPUT AND GATE
– TOP VIEW –


14 13 12 11 10 9 8
VDD (+2 to +6V)
GND
1 2 3 4 5 6 7

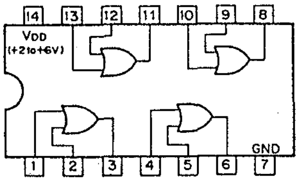


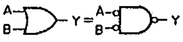
$Y = A \cdot B = \overline{\overline{A} + \overline{B}}$

A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

0; LOW LEVEL
1; HIGH LEVEL

TC74HC123F (TOSHIBA) FLAT PACKAGE
C-MOS DUAL RETRIGGERABLE MONOSTABLE MULTIVIBRATOR
– TOP VIEW –


14 13 12 11 10 9 8
VDD (+2 to +6V)
GND
1 2 3 4 5 6 7

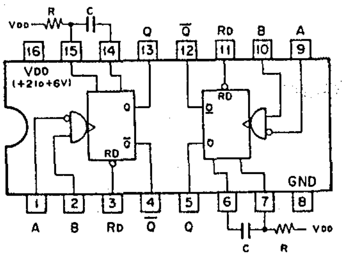


$Y = A + B = \overline{\overline{A} \cdot \overline{B}}$

A	B	Y
0	0	0
0	1	1
1	0	1
1	1	1

0; LOW LEVEL
1; HIGH LEVEL

TC74HC157AF (TOSHIBA) FLAT PACKAGE
C-MOS QUAD 2-LINE-TO-1-LINE DATA SELECTOR/MULTIPLEXER
– TOP VIEW –

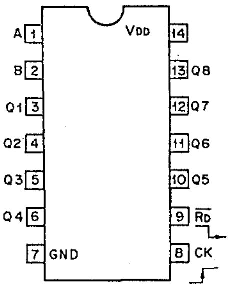

VDD
R
C
Q
Q̄
RD
B
A
16 15 14 13 12 11 10 9
VDD (+2 to +6V)
RD
GND
1 2 3 4 5 6 7 8
A B RD Q̄ Q
C R VDD

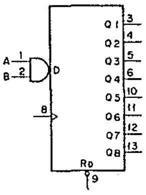
INPUT			OUTPUT	
$\overline{RD}$	A	B	Q	$\overline{Q}$
0	X	X	0	1
1	1	X	0	1
1	X	0	0	1
1	0	↑	⊓	⊔
1	↓	1	⊓	⊔
↑	0	1	⊓	⊔

0 ; LOW LEVEL
1 ; HIGH LEVEL
X ; DON'T CARE

OUTPUT PULSE WIDTH ≈ 0.46CR

SN74HC164ANS (TI) FLAT PACKAGE
TC74HC164AF (TOSHIBA) FLAT PACKAGE
C-MOS 8-BIT SERIAL-IN/PARALLEL-OUT SHIFT REGISTER
– TOP VIEW –


A 1
B 2
Q1 3
Q2 4
Q3 5
Q4 6
7 GND
VDD 14
13 Q8
12 Q7
11 Q6
10 Q5
9 RD
8 CK

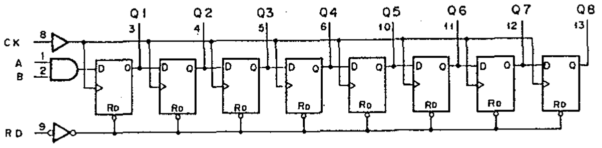

A 1
B 2
D
8
Q1 3
Q2 4
Q3 5
Q4 6
Q5 10
Q6 11
Q7 12
Q8 13
RD
9

INPUTS				OUTPUTS			
RD	CK	A	B	Q1	Q2	----	Q8
0	X	X	X	0	0	0	0
1	0	X	X	Q1o	Q2o	----	Q8o
1	↑	1	1	1	Q1n	----	Q7n
1	↑	0	X	0	Q1n	----	Q7n
1	↑	X	0	0	Q1n	----	Q7n

0;LOW LEVEL
1;HIGH LEVEL
X;DON'T CARE

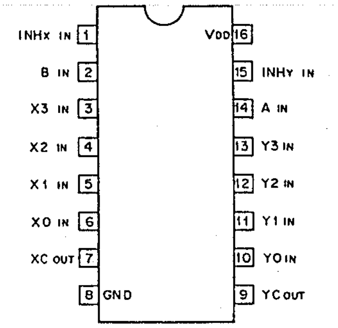
NOTE :

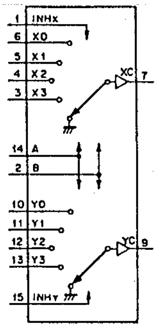
TYPE	VDD
TC74AC164F	+2 to +5.5V
OTHER TYPES	+2 to +6V


Q1 3
Q2 4
Q3 5
Q4 6
Q5 10
Q6 11
Q7 12
Q8 13
CK 8
A 1
B 2
D Q
RD
RD 9

TC74HC245AF (TOSHIBA) FLAT PACKAGE

C-MOS BILATERAL BUS TRANSCEIVERS WITH 3-STATE OUTPUTS
- TOP VIEW -


INHx IN 1
B IN 2
X3 IN 3
X2 IN 4
X1 IN 5
X0 IN 6
XC OUT 7
8 GND
VDD 16
15 INHY IN
14 A IN
13 Y3 IN
12 Y2 IN
11 Y1 IN
10 YO IN
9 YC OUT

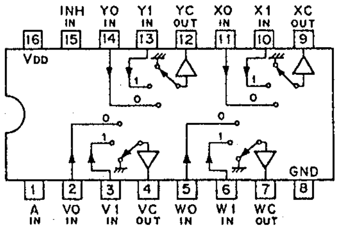

1 INHx
6 XO
5 X1
4 X2
3 X3
XC 7
14 A
2 B
10 YO
11 Y1
12 Y2
13 Y3
YC 9
15 INHY

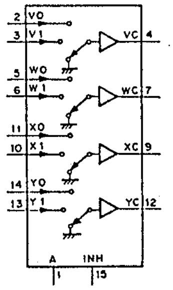
CONTROL IN			ON CHANNEL
INH	B	A	
0	0	0	0
0	0	1	1
0	1	0	2
0	1	1	3
1	X	X	GND

0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE

TC74HC32AF (TOSHIBA) FLAT PACKAGE

C-MOS 2-INPUT OR GATE
- TOP VIEW -


INH IN 15
YO IN 14
Y1 IN 13
YC OUT 12
XO IN 11
X1 IN 10
XC OUT 9
16 VDD
0
1
A IN 1
VO IN 2
V1 IN 3
VC OUT 4
WO IN 5
W1 IN 6
WC OUT 7
8 GND

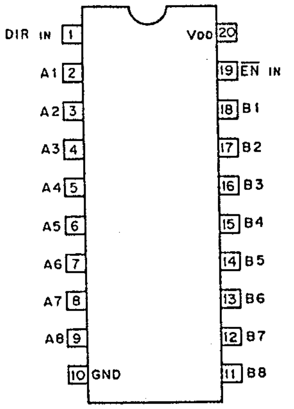

2 VO
3 V1
VC 4
5 WO
6 W1
WC 7
11 XO
10 X1
XC 9
14 YO
13 Y1
YC 12
A 1
INH 15

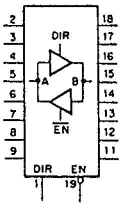
CONT. IN		ON CHANNEL
INH	A	
0	0	0
0	1	1
1	X	GND

0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE

TC74HC74AF (TOSHIBA) FLAT PACKAGE

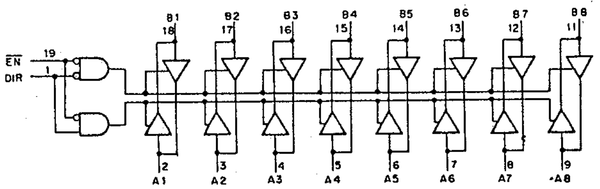
C-MOS D-TYPE FLIP FLOP WITH DIRECT SET/RESET
- TOP VIEW -


DIR IN 1
A1 2
A2 3
A3 4
A4 5
A5 6
A6 7
A7 8
A8 9
10 GND
VDD 20
19 EN IN
18 B1
17 B2
16 B3
15 B4
14 B5
13 B6
12 B7
11 B8


2 3 4 5 6 7 8 9
18 17 16 15 14 13 12 11
DIR
A
B
EN
DIR 1
EN 19

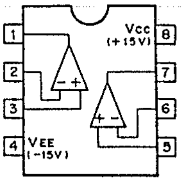
EN	DIR	OPERATION
0	0	B to A
0	1	A to B
1	X	HI - Z

0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE
HI-Z; HIGH IMPEDANCE


EN 19
DIR 1
B1 18
B2 17
B3 16
B4 15
B5 14
B6 13
B7 12
B8 11
2 A1
3 A2
4 A3
5 A4
6 A5
7 A6
8 A7
9 A8

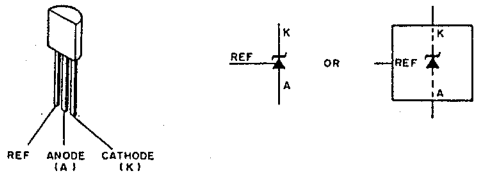
TL082CPS (TI) FLAT PACKAGE

OPERATIONAL AMPLIFIER
(J FET-INPUT)
- TOP VIEW -


1
2
3
4
Vcc (+15V) 8
7
6
5
VEE (-15V)

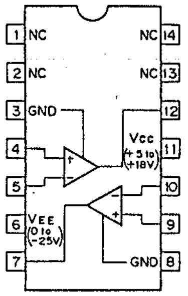
TL431CLP (TI)

ADJUSTABLE PRECISION SHUNT REGULATOR


REF
ANODE (A)
CATHODE (K)
REF
K
A
OR
REF
K
A

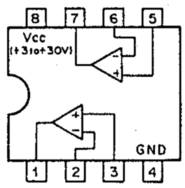
uPC319G2 (NEC) FLAT PACKAGE

DUAL VOLTAGE COMPARATOR
- TOP VIEW -


1 NC
2 NC
3 GND
4
5
6 VEE (0 to -25V)
7
NC 14
NC 13
12
Vcc (+5 to +18V) 11
10
9
GND 8

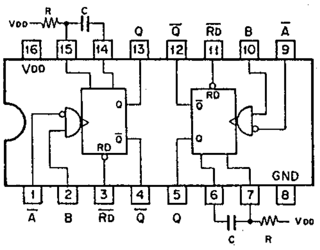
uPC358G2 (NEC) FLAT PACKAGE

DUAL OPERATIONAL AMPLIFIERS
- TOP VIEW -


8 7 6 5
Vcc (+3 to +30V)
GND
1 2 3 4

UPD74HC123AC (NEC)

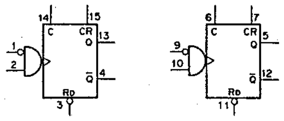
C-MOS DUAL RETRIGGERABLE MONOSTABLE MULTIVIBRATORS
- TOP VIEW -


VDD
R
C
Q
Q̄
RD
B
Ā
16 15 14 13 12 11 10 9
VDD
GND
1 2 3 4 5 6 7 8
Ā B RD Q̄ Q
C R VDD

INPUT			OUTPUT	
RD	A	B	Q	Q̄
0	X	X	0	1
1	1	X	0	1
1	X	0	0	1
1	0	↑	⎍	⊔
1	↓	1	⎍	⊔
↑	0	1	⎍	⊔

0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE

OUTPUT PULSE WIDTH ≈ 0.46CR

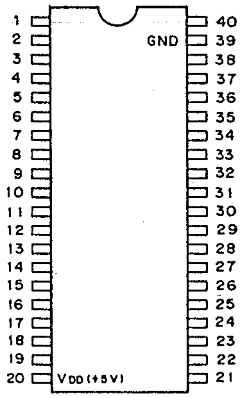

14 15
1 2
C CR
Q 13
Q̄ 4
RD 3
6 7
9 10
C CR
Q 5
Q̄ 12
RD 11

NOTE:

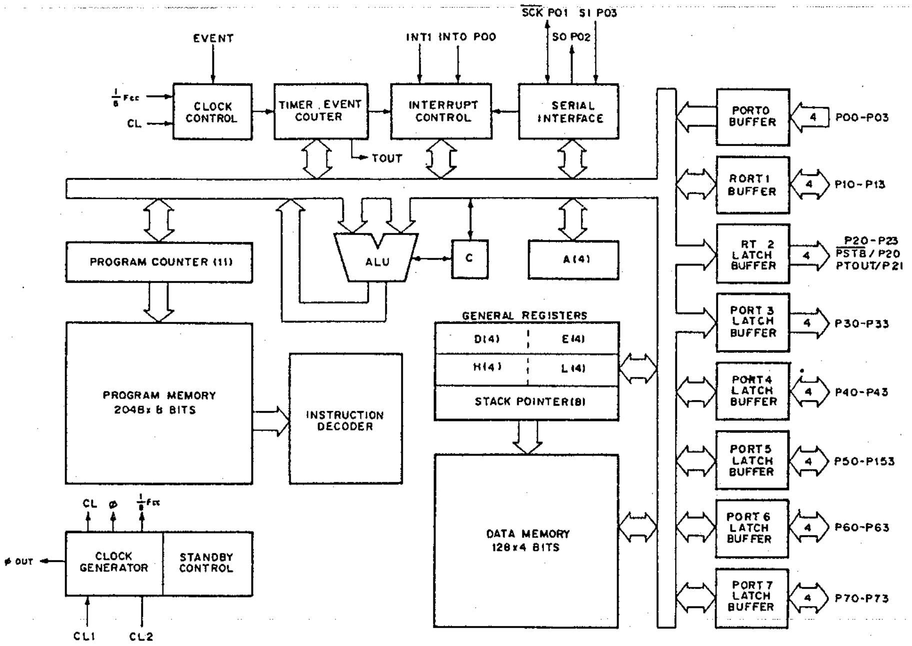
TYPE	VDD
TC74HCT123AF	+5V
OTHER TYPES	+2 to +6V

uPD7507HCU

4 BIT MICRO COMPUTER
- TOP VIEW -



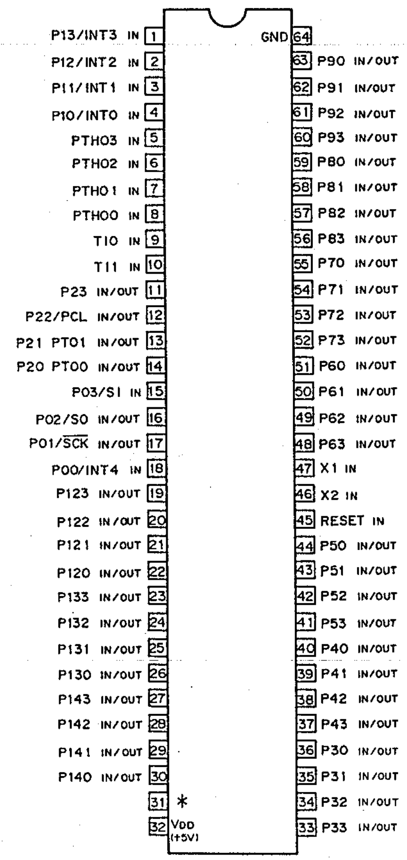
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
40
39
38
37
36
35
34
33
32
31
30
29
28
27
26
25
24
23
22
21
GND
VDD (+5V)

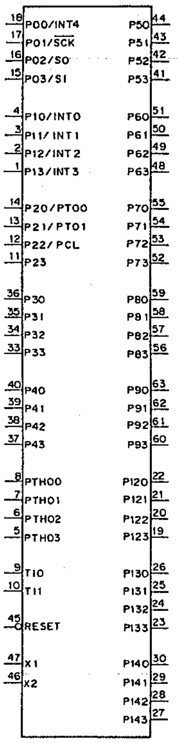


EVENT
INT1 INT0 P00
SCK P01 SI P03
SO P02
1/8 Fcc
CL
CLOCK CONTROL
TIMER EVENT COUTER
INTERRUPT CONTROL
SERIAL INTERFACE
TOUT
PROGRAM COUNTER (11)
ALU
C
A(4)
GENERAL REGISTERS
D(4)
E(4)
H(4)
L(4)
STACK POINTER(8)
PROGRAM MEMORY 2048x 8 BITS
INSTRUCTION DECODER
DATA MEMORY 128x4 BITS
CL
ø
1/8 Fcc
ø OUT
CLOCK GENERATOR
STANDBY CONTROL
CL1
CL2
PORT0 BUFFER
RORT1 BUFFER
RT 2 LATCH BUFFER
PORT 3 LATCH BUFFER
PORT4 LATCH BUFFER
PORT5 LATCH BUFFER
PORT 6 LATCH BUFFER
PORT 7 LATCH BUFFER
4
P00-P03
P10-P13
P20-P23
PSTB/P20
PTOUT/P21
P30-P33
P40-P43
P50-P153
P60-P63
P70-P73

UPD75104CW-271 (NEC)
C-MOS 1 CHIP 4-BIT MICROCOMPUTER
– TOP VIEW –

UPD75104CW-271(1/3)

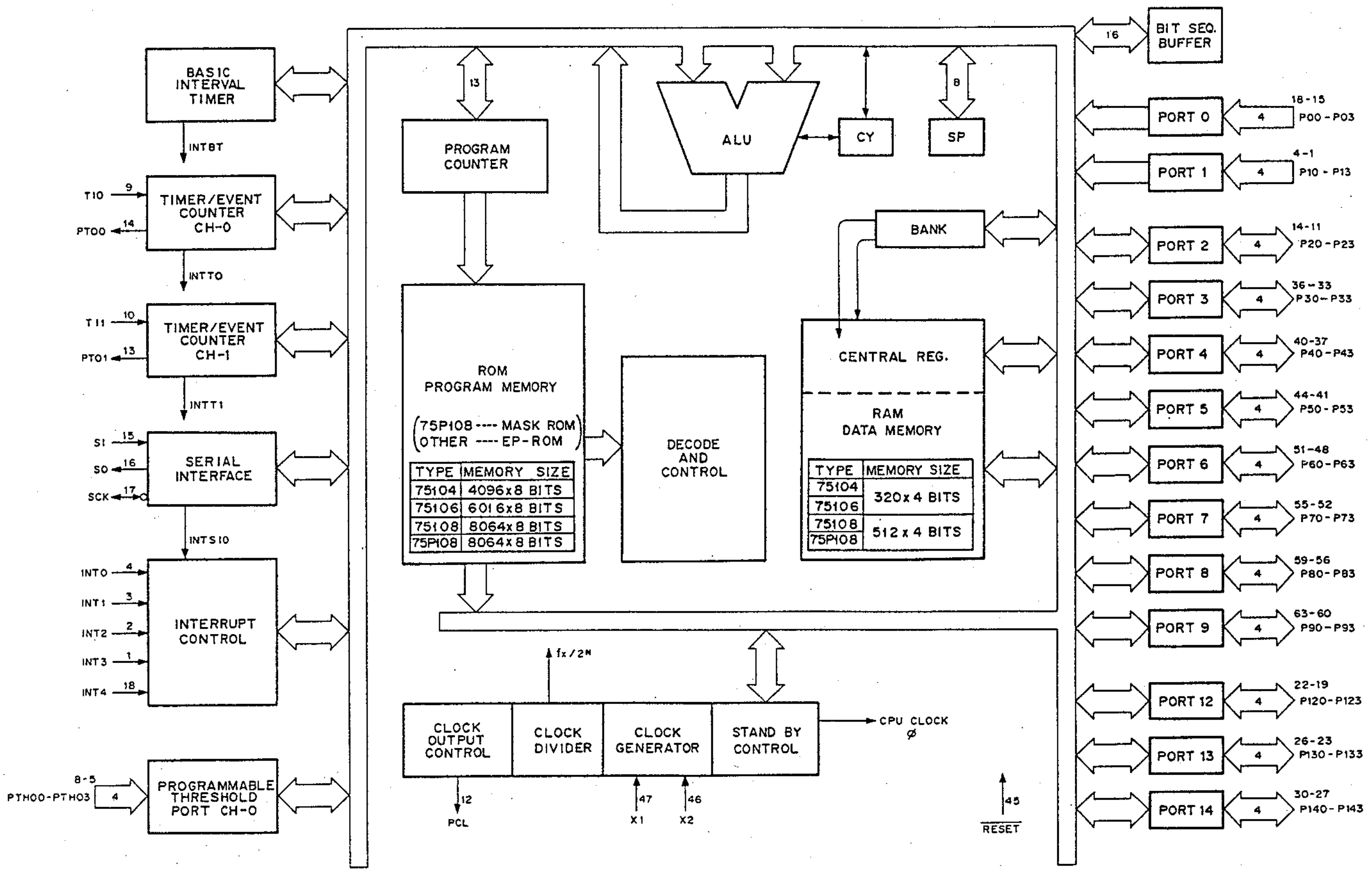

P13/INT3 IN 1
P12/INT2 IN 2
P11/INT1 IN 3
P10/INT0 IN 4
PTH03 IN 5
PTH02 IN 6
PTH01 IN 7
PTH00 IN 8
TI0 IN 9
TI1 IN 10
P23 IN/OUT 11
P22/PCL IN/OUT 12
P21 PTO1 IN/OUT 13
P20 PTO0 IN/OUT 14
P03/SI IN 15
P02/SO IN/OUT 16
P01/SCK IN/OUT 17
P00/INT4 IN 18
P123 IN/OUT 19
P122 IN/OUT 20
P121 IN/OUT 21
P120 IN/OUT 22
P133 IN/OUT 23
P132 IN/OUT 24
P131 IN/OUT 25
P130 IN/OUT 26
P143 IN/OUT 27
P142 IN/OUT 28
P141 IN/OUT 29
P140 IN/OUT 30
31 *
32 VDD (+5V)
GND 64
63 P90 IN/OUT
62 P91 IN/OUT
61 P92 IN/OUT
60 P93 IN/OUT
59 P80 IN/OUT
58 P81 IN/OUT
57 P82 IN/OUT
56 P83 IN/OUT
55 P70 IN/OUT
54 P71 IN/OUT
53 P72 IN/OUT
52 P73 IN/OUT
51 P60 IN/OUT
50 P61 IN/OUT
49 P62 IN/OUT
48 P63 IN/OUT
47 X1 IN
46 X2 IN
45 RESET IN
44 P50 IN/OUT
43 P51 IN/OUT
42 P52 IN/OUT
41 P53 IN/OUT
40 P40 IN/OUT
39 P41 IN/OUT
38 P42 IN/OUT
37 P43 IN/OUT
36 P30 IN/OUT
35 P31 IN/OUT
34 P32 IN/OUT
33 P33 IN/OUT


18 P00/INT4
17 P01/SCK
16 P02/SO
15 P03/SI
4 P10/INT0
3 P11/INT1
2 P12/INT2
1 P13/INT3
14 P20/PTO0
13 P21/PTO1
12 P22/PCL
11 P23
36 P30
35 P31
34 P32
33 P33
40 P40
39 P41
38 P42
37 P43
8 PTH00
7 PTH01
6 PTH02
5 PTH03
9 TI0
10 TI1
45 RESET
47 X1
46 X2
P50 44
P51 43
P52 42
P53 41
P60 51
P61 50
P62 49
P63 48
P70 55
P71 54
P72 53
P73 52
P80 59
P81 58
P82 57
P83 56
P90 63
P91 62
P92 61
P93 60
P120 22
P121 21
P122 20
P123 19
P130 26
P131 25
P132 24
P133 23
P140 30
P141 29
P142 28
P143 27

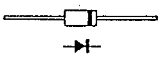
*; PIN31
Vpp(+5V) ; 75P108 TYPE
NC ; OTHER TYPES

UPD75104CW-271(2/3)

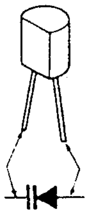
INT0 – INT4	; INTERRUPT INPUTS
P00 – P03	; 4-BIT INPUT PORT (PORT0)
P10 – P13	; 4-BIT INPUT PORT (PORT1)
P20 – P23	; 4-BIT I/O PORT (PORT2)
P30 – P33	; 4-BIT I/O PORT (PORT3), PROGRAMMABLE
P40 – P43	; 4-BIT I/O PORT (PORT4)
P50 – P53	; 4-BIT I/O PORT (PORT5)
P60 – P63	; 4-BIT I/O PORT (PORT6), PROGRAMMABLE
P70 – P73	; 4-BIT I/O PORT (PORT7)
P80 – P83	; 4-BIT I/O PORT (PORT8)
P90 – P93	; 4-BIT I/O PORT (PORT9)
P120 – P123	; 4-BIT I/O PORT (PORT12), OPEN DRAIN
P130 – P133	; 4-BIT I/O PORT (PORT13), OPEN DRAIN
P140 – P143	; 4-BIT I/O PORT (PORT14), OPEN DRAIN
PCL	; CLOCK OUTPUT, PROGRAMABLE
PTH00 – PTH03	; THRESHOLD 4-BIT ANALOG INPUT PORT, PROGRAMABLE
PTO0	; TIMER/EVENT COUNTER OUTPUT (CH-1)
PTO1	; TIMER/EVENT COUNTER OUTPUT (CH-2)
RESET	; SYSTEM RESET INPUT
SI	; SERIAL INTERFACE DATA INPUT
SO	; SERIAL INTERFACE DATA OUTPUT
SCK	; SERIAL INTERFACE CLOCK INPUT/OUTPUT
TI0	; TIMER/EVENT COUNTER CLOCK INPUT (CH-0)
TI1	; TIMER/EVENT COUNTER CLOCK INPUT (CH-1)
X1, X2	; CONNECTED CRYSTAL FOR SYSTEM CLOCK GENERATE


BASIC INTERVAL TIMER
INTBT
TI0 9
PTO0 14
TIMER/EVENT COUNTER CH-0
INTT0
TI1 10
PTO1 13
TIMER/EVENT COUNTER CH-1
INTT1
SI 15
SO 16
SCK 17
SERIAL INTERFACE
INTSIO
INT0 4
INT1 3
INT2 2
INT3 1
INT4 18
INTERRUPT CONTROL
8-5
PTH00-PTH03 4
PROGRAMMABLE THRESHOLD PORT CH-0
13
PROGRAM COUNTER
ALU
CY
SP
8
BANK
ROM PROGRAM MEMORY
(75P108 ---- MASK ROM
OTHER ---- EP-ROM)
TYPE | MEMORY SIZE
75104 | 4096x8 BITS
75106 | 6016x8 BITS
75108 | 8064x8 BITS
75P108 | 8064x8 BITS
DECODE AND CONTROL
CENTRAL REG.
RAM DATA MEMORY
TYPE | MEMORY SIZE
75104 75106 | 320x4 BITS
75108 75P108 | 512x4 BITS
fx/2N
CLOCK OUTPUT CONTROL
CLOCK DIVIDER
CLOCK GENERATOR
STAND BY CONTROL
CPU CLOCK ϕ
12 PCL
47 X1
46 X2
45 RESET
16
BIT SEQ. BUFFER
PORT 0 4 18-15 P00-P03
PORT 1 4 4-1 P10-P13
PORT 2 4 14-11 P20-P23
PORT 3 4 36-33 P30-P33
PORT 4 4 40-37 P40-P43
PORT 5 4 44-41 P50-P53
PORT 6 4 51-48 P60-P63
PORT 7 4 55-52 P70-P73
PORT 8 4 59-56 P80-P83
PORT 9 4 63-60 P90-P93
PORT 12 4 22-19 P120-P123
PORT 13 4 26-23 P130-P133
PORT 14 4 30-27 P140-P143

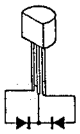
10E-2N
11E2
1SS119
1SS148
ERC01-02FL



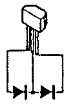
FC53M-4



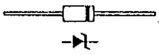
MC921



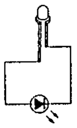
MC932



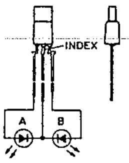
RD2.7ES-B2
RD3.9ES-B2
RD6.8ES-B2
RD9.1EW



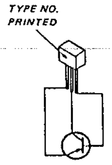
TLG123 ; ORANGE
TLG123A ; GREEN



TLYG208 ; A = YEL , B = GRN

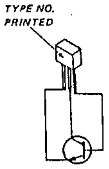


2SA1175-HFE



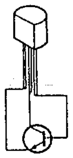
TYPE NO.
PRINTED

2SC2785-HFE

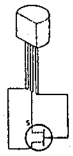


TYPE NO.
PRINTED

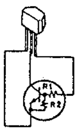
2SC2878B



2SK523-K2



DTC144ES (R1 = 47K, R2 = 47K)



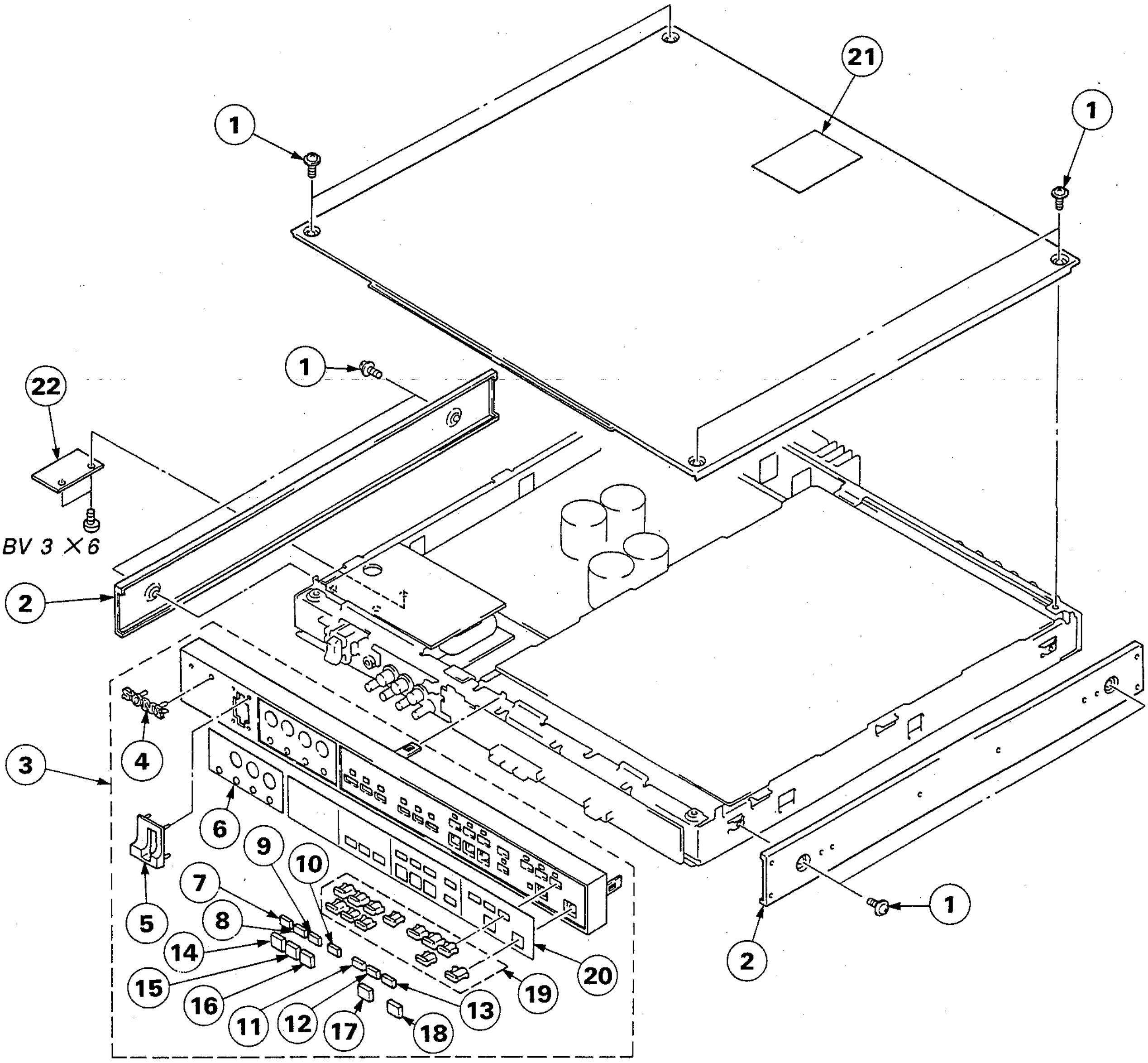
SECTION 5
EXPLODED VIEWS

NOTE:

- Items marked "*" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- The mechanical parts with no reference number in the exploded views are not supplied.
- The construction parts of an assembled part are indicated with a collation number in the remark column.

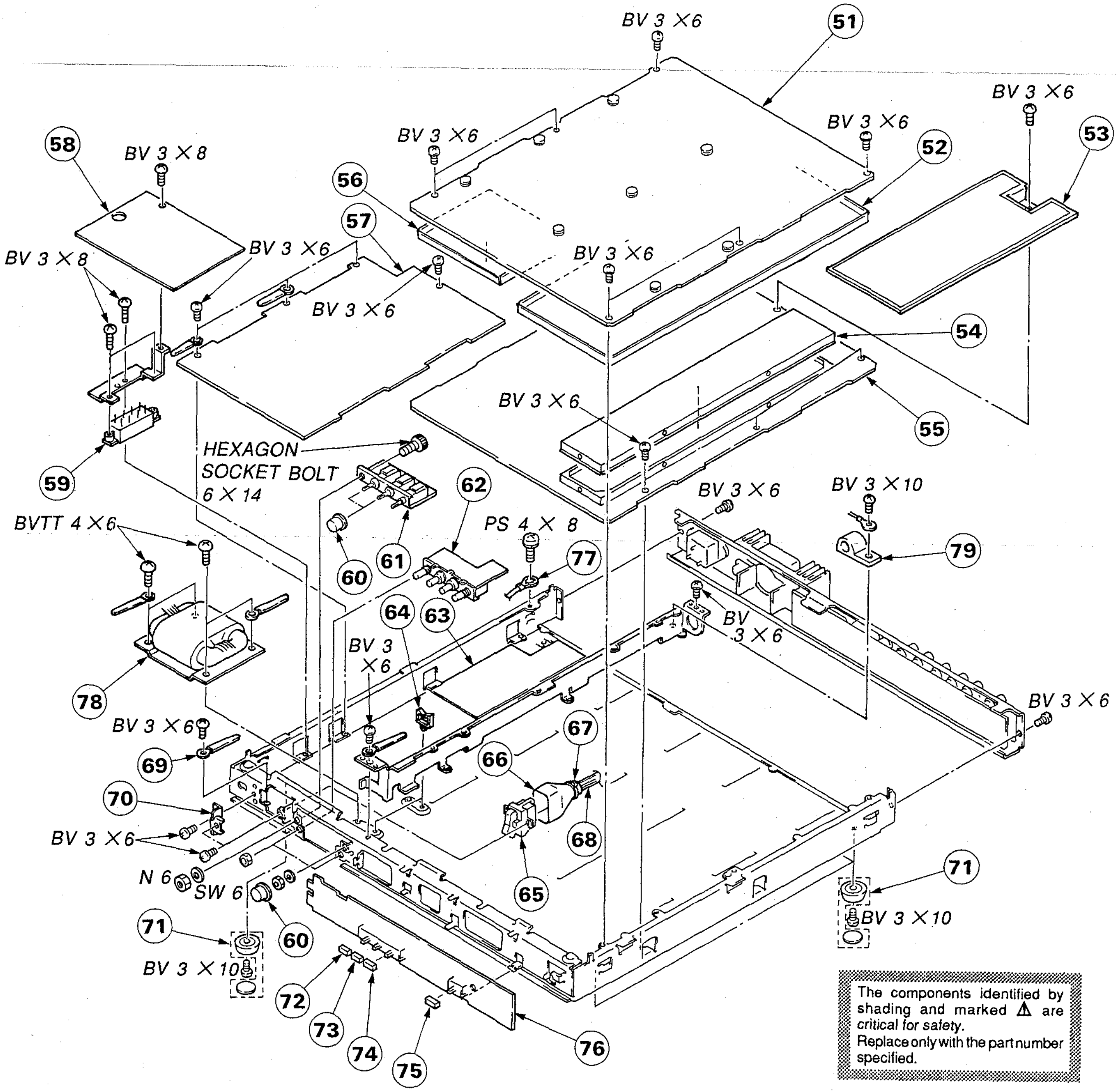
The components identified by shading and mark ⚠ are critical for safety.
Replace only with part number specified.

5-1. CABINET ASSEMBLY



Ref.No	Part No.	Description	Remark
1	3-710-901-01	SCREW, TAPPING	
2	*3-744-529-01	PLATE, SIDE	
3	*A-7180-062-A	PANEL ASSY, FRONT	
4	*3-566-707-21	EMBLEM, SONY	
5	*4-604-107-11	GUARD, POWER SW	
6	3-174-442-01	SHEET (SMALL), P PANEL	
7	3-744-513-01	KEY TOP (SMALL)(MOSAIC)	
8	3-744-513-11	KEY TOP (SMALL)(POSTER)	
9	3-744-513-21	KEY TOP (SMALL)(MULTI)	
10	3-744-513-31	KEY TOP (SMALL)(OFF)	
11	3-744-513-41	KEY TOP (SMALL)(FIELD ODD	
12	3-744-513-51	KEY TOP (SMALL)(FIELD EVEN)	
13	3-744-513-61	KEY TOP (SMALL)(FRAME)	
14	3-744-514-01	KEY TOP (MIDDLE)(—)	
15	3-744-514-11	KEY TOP (MIDDLE)(+)	
16	3-744-514-21	KEY TOP (MIDDLE)(SET)	
17	3-744-514-31	KEY TOP (MIDDLE)(MEMORY IN)	
18	3-744-514-41	KEY TOP (MIDDLE)(CLEAR)	
19	3-710-920-01	HOLDER, KEY	
20	3-174-443-02	SHEET (LARGE), P PANEL	
21	3-177-513-01	LABEL, PRESET	
22	*3-174-440-01	SHEET	

5-2. CHASSIS ASSEMBLY

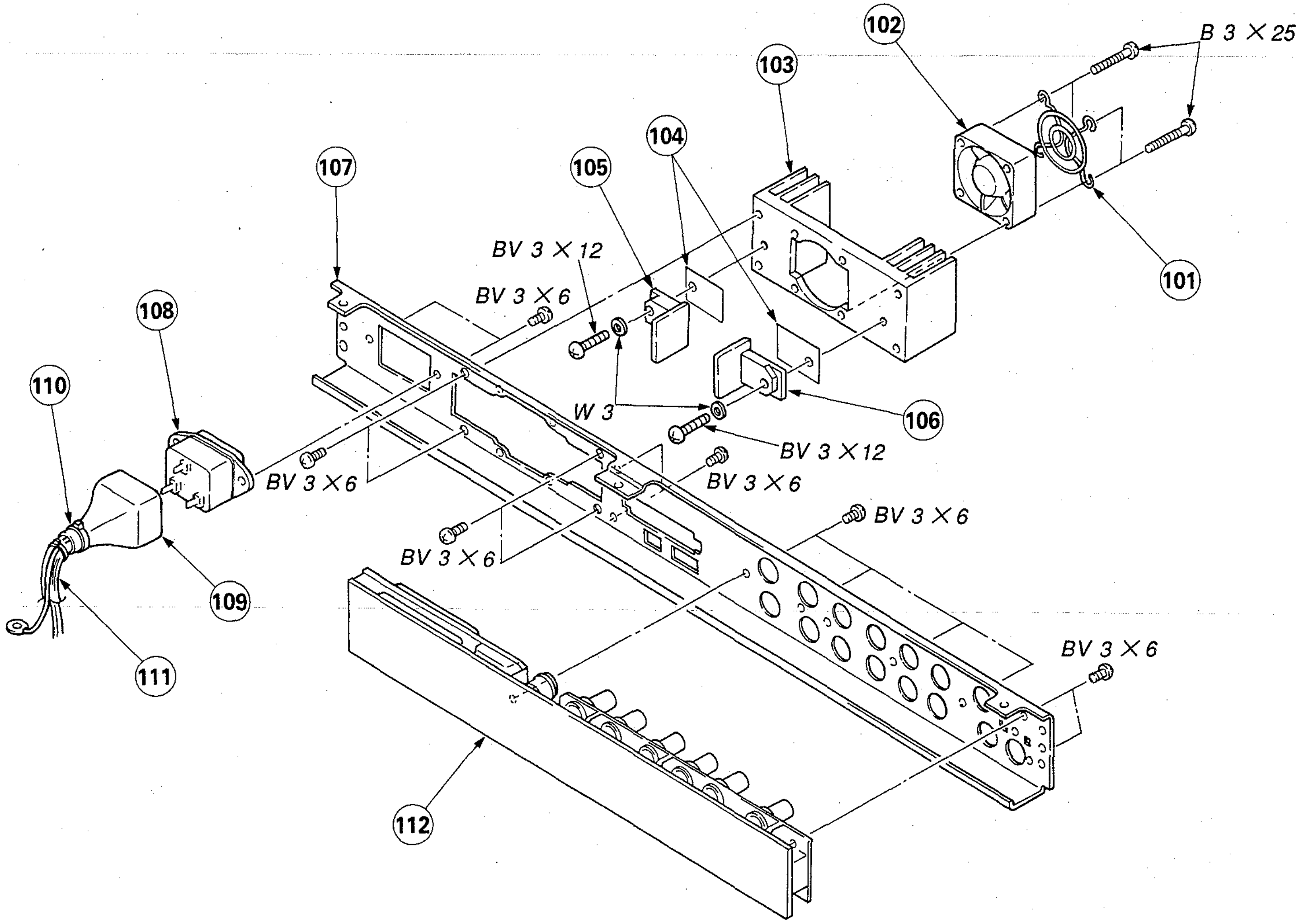


BV 3 X6
(51)
BV 3 X6
BV 3 X6
(52)
(53)
(58)
BV 3 X8
BV 3 X6
(56)
(57)
BV 3 X8
BV 3 X6
BV 3 X6
BV 3 X6
(54)
BV 3 X6
(55)
HEXAGON SOCKET BOLT 6 X 14
(59)
(62)
BV 3 X6
BV 3 X10
BVTT 4 X6
PS 4 X 8
(79)
(61)
(77)
(60)
(64)
(63)
BV 3 X6
BV 3 X6
(78)
BV 3 X6
BV 3 X6
(67)
(69)
(66)
(70)
(68)
BV 3 X6
(71)
N 6
SW 6
(65)
BV 3 X10
(71)
(60)
BV 3 X10
(72)
(73)
(74)
(75)
(76)

The components identified by shading and marked ⚠ are *critical for safety*.
Replace only with the part number specified.

Ref.No	Part No	Description	Remark
51	*A-7160-098-A	FM-30 BOARD, COMPLETE	
52	*3-744-531-01	LID (LARGE), FM SHIELD CASE	
53	*3-176-367-01	SHEET (P), SHIELD	
54	*3-173-747-01	COVER, IVP SHIELD	
55	*A-7160-097-A	IV-39 BOARD, COMPLETE	
56	*3-744-518-01	LID (SMALL), FM SHILED CASE	
57	*A-7160-099-A	PS-271 BOARD, COMPLETE	
58	*3-174-438-01	SHEET, INSULATING, SELECTOR	
59	⚠ 1-572-948-11	SWTICH, VOLTAGE SELECTION	
60	X-3710-901-1	KNOB ASSY, LEVEL ADJUSTMENT	
61	*A-7170-144-A	MOUNTED PCB, VR-126	
62	*A-7170-145-A	MOUNTED PCB, VR-127	
63	*3-744-507-01	SHEET, PS INSULATING	
64	*4-314-320-00	HOLDER, WIRE	
65	⚠ 1-570-384-11	SWITCH, SEESAW (AC POWER)	
66	*3-725-505-01	COVER, SWITCH	
67	*3-701-748-00	CLAMP	
68	*1-945-803-11	HARNESS (PP-01)	
69	3-703-150-11	STOPPER, WIRING	
70	*3-744-505-01	BRACKET, POWER SWITCH	
71	X-3556-910-0	FOOT ASSY, MF	
72	3-744-504-01	KEY TOP(VIDEO)	
73	3-744-504-11	KEY TOP(S VIDEO)	
74	3-744-504-21	KEY TOP(RGB)	
75	3-744-504-61	KEY TOP(LAP DISSOLVE)	
76	*A-7170-143-A	MOUNTED PCB, FP-42	
77	1-535-316-11	TERMINAL, GROUND (M4)	
78	⚠ 1-450-781-11	TRANSFORMER, POWER	
79	1-543-652-11	CORE, RING	

5-3. REAR PANEL ASSEMBLY


102
B 3 X 25
103
104
107
105
BV 3 X 12
BV 3 X 6
101
108
110
W 3
106
BV 3 X 6
BV 3 X 12
BV 3 X 6
BV 3 X 6
BV 3 X 6
109
111
BV 3 X 6
112

Ref.No	Part No	Description	Remark
101	*3-744-536-01	GUARD (FG40A), FAN	
102	1-541-768-11	MOTOR, DC FAN	
103	*3-744-516-03	HEAT SINK	
104	*4-613-505-01	SHEET, RADIATION	
105	*A-7170-141-A	MOUNTED PCB, RE-84	
106	*A-7170-142-A	MOUNTED PCB, RE-85	
107	*3-174-444-01	PANEL (P), REAR	
108	⚠1-580-375-11	INLET 3P	
109	*4-601-466-11	COVER, 3P INLET	
110	*3-701-748-00	CLAMP	
111	*1-945-830-11	HARNESS (PP-02)	
112	*A-7170-140-A	MOUNTED PCB, RP-67	

The components identified by shading and marked ⚠ are critical for safety.
Replace only with the part number specified.

IV-39

SECTION 6
ELECTRICAL PARTS LIST

NOTE:

The components identified by shading and mark ⚠ are critical for safety.
Replace only with part number specified.

- Items marked "*" are not stocked because they are seldom required for routine servicing. Some delay should be expected when ordering these items.
- All variable and adjustable resistors have characteristic curve B, unless otherwise stated.

RESISTORS
- All resistor values are in Ohms
- F: non-flammable

When indicating parts by reference number, please include the board name.

CAPACITORS
- MF: μF, PF: μμF

COILS
- MMH: mH, UH: μH

Ref.No	Part No.	Description			Remark
	*A-7160-097-A	IV-39 BOARD, COMPLETE			
		*********************			
	*4-386-173-01	SPACER			
		<CAPASITOR>			
C101	1-124-589-11	ELECT	47MF	20%	16V
C102	1-161-051-00	CERAMIC	0.01MF	10%	25V
C103	1-124-455-00	ELECT	100MF	10%	16V
C104	1-124-589-11	ELECT	47MF	20%	16V
C105	1-124-589-11	ELECT	47MF	20%	16V
C106	1-126-157-11	ELECT	10MF	20%	16V
C107	1-161-051-00	CERAMIC	0.01MF	10%	25V
C108	1-124-589-11	ELECT	47MF	20%	16V
C109	1-161-051-00	CERAMIC	0.01MF	10%	25V
C110	1-102-951-00	CERAMIC	15PF	5%	50V
C111	1-102-951-00	CERAMIC	15PF	5%	50V
C112	1-102-953-00	CERAMIC	18PF	5%	50V
C113	1-102-961-00	CERAMIC	27PF	5%	50V
C114	1-102-952-00	CERAMIC	16PF	5%	50V
C115	1-102-960-00	CERAMIC	24PF	5%	50V
C116	1-102-958-00	CERAMIC	20PF	5%	50V
C117	1-124-589-11	ELECT	47MF	20%	16V
C118	1-161-051-00	CERAMIC	0.01MF	10%	25V
C119	1-124-455-00	ELECT	100MF	20%	16V
C120	1-102-942-00	CERAMIC	5PF	0.5PF	50V
C121	1-124-455-00	ELECT	100MF	20%	16V
C122	1-126-157-11	ELECT	10MF	20%	16V
C123	1-124-589-11	ELECT	47MF	20%	16V
C124	1-161-051-00	CERAMIC	0.01MF	10%	25V
C125	1-102-960-00	CERAMIC	24PF	5%	50V
C126	1-124-455-00	ELECT	100MF	20%	16V
C127	1-124-589-11	ELECT	47MF	20%	16V
C128	1-124-589-11	ELECT	47MF	20%	16V
C129	1-124-234-00	ELECT	22MF	20%	16V
C130	1-124-589-11	ELECT	47MF	20%	16V
C131	1-124-234-00	ELECT	22MF	20%	16V
C132	1-161-051-00	CERAMIC	0.01MF	10%	25V
C133	1-124-455-00	ELECT	100MF	20%	16V
C134	1-102-961-00	CERAMIC	27PF	5%	50V
C135	1-102-960-00	CERAMIC	24PF	5%	50V
C136	1-124-589-11	ELECT	47MF	20%	16V
C137	1-102-960-00	CERAMIC	24PF	5%	50V
C138	1-102-951-00	CERAMIC	15PF	5%	50V
C139	1-126-157-11	ELECT	10MF	20%	16V
C140	1-126-157-11	ELECT	10MF	20%	16V
C141	1-124-589-11	ELECT	47MF	20%	16V
C142	1-161-051-00	CERAMIC	0.01MF	10%	25V
C143	1-124-455-00	ELECT	100MF	20%	16V
C144	1-102-527-11	CERAMIC	82PF	5%	50V
C145	1-124-455-00	ELECT	100MF	20%	16V
C146	1-124-455-00	ELECT	100MF	20%	16V
C147	1-161-051-00	CERAMIC	0.01MF	10%	25V
C148	1-161-051-00	CERAMIC	0.01MF	10%	25V
C149	1-161-051-00	CERAMIC	0.01MF	10%	25V
C150	1-126-157-11	ELECT	10MF	20%	16V
C151	1-161-051-00	CERAMIC	0.01MF	10%	25V
C152	1-102-961-00	CERAMIC	27PF	5%	50V
C154	1-102-953-00	CERAMIC	18PF	5%	50V
C155	1-161-051-00	CERAMIC	0.01MF	10%	25V
C301	1-124-589-11	ELECT	47MF	20%	16V
C302	1-161-051-00	CERAMIC	0.01MF	10%	25V
C303	1-124-589-11	ELECT	47MF	20%	16V
C304	1-124-465-00	ELECT	0.47MF	20%	50V
C305	1-124-589-11	ELECT	47MF	20%	16V
C306	1-124-589-11	ELECT	47MF	20%	16V
C307	1-161-051-00	CERAMIC	0.01MF	10%	25V
C308	1-124-257-00	ELECT	2.2MF	20%	50V
C309	1-102-973-00	CERAMIC	100PF	5%	50V
C310	1-161-021-11	CERAMIC	0.047MF	10%	25V
C311	1-161-772-11	CERAMIC	0.1MF	10%	25V
C312	1-161-021-11	CERAMIC	0.047MF	10%	25V
C313	1-161-772-11	CERAMIC	0.1MF	10%	25V
C314	1-124-465-00	ELEC1T	0.47MF	20%	50V
C315	1-126-157-11	ELECT	10MF	20%	16V
C316	1-161-021-11	CERAMIC	0.047MF	10%	25V
C317	1-124-465-00	ELECT	0.47MF	20%	50V
C318	1-126-157-11	ELECT	10MF	20%	16V
C319	1-161-021-11	CERAMIC	0.047MF	10%	25V
C320	1-161-021-11	CERAMIC	0.047MF	10%	25V
C321	1-124-589-11	ELECT	47MF	20%	16V
C322	1-161-021-11	CERAMIC	0.047MF	10%	25V
C323	1-124-589-11	ELECT	47MF	20%	16V
C324	1-161-021-11	CERAMIC	0.047MF	10%	25V
C325	1-126-157-11	ELECT	10MF	20%	16V
C326	1-102-824-00	CERAMIC	470PF	5%	50V

Ref.No	Part No.	Description			Remark
C327	1-124-589-11	ELECT	47MF	20%	16V
C328	1-161-021-11	CERAMIC	0.047MF	10%	25V
C329	1-124-589-11	ELECT	47MF	20%	16V
C330	1-161-021-11	CERAMIC	0.047MF	10%	25V
C331	1-124-463-00	ELECT	0.1MF	20%	50V
C332	1-124-463-00	ELECT	0.1MF	20%	50V
C333	1-124-463-00	ELECT	0.1MF	20%	50V
C334	1-124-463-00	ELECT	0.1MF	20%	50V
C335	1-124-463-00	ELECT	0.1MF	20%	50V
C336	1-124-463-00	ELECT	0.1MF	20%	50V
C337	1-124-463-00	ELECT	0.1MF	20%	50V
C338	1-124-589-11	ELECT	47MF	20%	16V
C339	1-161-021-11	CERAMIC	0.047MF	10%	25V
C340	1-124-463-00	ELECT	0.1MF	20%	50V
C341	1-124-589-11	ELECT	47MF	20%	16V
C342	1-161-051-00	CERAMIC	0.01MF	10%	25V
C343	1-124-589-11	ELECT	47MF	20%	16V
C345	1-124-589-11	ELECT	47MF	20%	16V
C346	1-102-961-00	CERAMIC	27PF	5%	50V
C347	1-102-950-00	CERAMIC	13PF	5%	50V
C348	1-102-960-00	CERAMIC	24PF	5%	50V
C349	1-102-953-00	CERAMIC	18PF	5%	50V
C351	1-124-589-11	ELECT	47MF	20%	16V
C352	1-161-051-00	CERAMIC	0.01MF	10%	25V
C353	1-124-589-11	ELECT	47MF	20%	16V
C354	1-102-958-00	CERAMIC	20PF	5%	50V
C355	1-124-589-11	ELECT	47MF	20%	16V
C357	1-124-589-11	ELECT	47MF	20%	16V
C358	1-161-051-00	CERAMIC	0.01MF	10%	25V
C359	1-124-589-11	ELECT	47MF	20%	16V
C360	1-124-589-11	ELECT	47MF	20%	16V
C361	1-102-947-00	CERAMIC	10PF	0.5PF	50V
C362	1-101-884-00	CERAMIC	56PF	5%	50V
C363	1-102-951-00	CERAMIC	15PF	5%	50V
C501	1-124-465-00	ELECT	0.47MF	20%	50V
C502	1-126-157-11	ELECT	10MF	20%	16V
C503	1-161-051-00	CERAMIC	0.01MF	10%	25V
C504	1-161-051-00	CERAMIC	0.01MF	10%	25V
C505	1-126-157-11	ELECT	10MF	20%	16V
C506	1-124-234-00	ELECT	22MF	20%	16V
C507	1-161-021-11	CERAMIC	0.047MF	10%	25V
C508	1-124-234-00	ELECT	22MF	20%	16V
C509	1-161-021-11	CERAMIC	0.047MF	10%	25V
C510	1-126-163-11	ELECT	4.7MF	20%	25V
C511	1-161-051-00	CERAMIC	0.01MF	10%	25V
C512	1-161-051-00	CERAMIC	0.01MF	10%	25V
C513	1-126-157-11	ELECT	10MF	20%	16V
C514	1-161-051-00	CERAMIC	0.01MF	10%	25V
C515	1-161-051-00	CERAMIC	0.01MF	10%	25V
C516	1-161-051-00	CERAMIC	0.01MF	10%	25V
C517	1-161-051-00	CERAMIC	0.01MF	10%	25V
C518	1-126-301-11	ELECT	1MF	20%	50V
C519	1-126-157-11	ELECT	10MF	20%	16V
C520	1-161-051-00	CERAMIC	0.01MF	10%	25V
C521	1-126-151-11	ELECT	4.7MF	20%	16V
C522	1-161-482-00	CERAMIC	0.068MF	10%	50V
C523	1-161-051-00	CERAMIC	0.01MF	10%	25V
C524	1-102-960-00	CERAMIC	24PF	5%	50V
C525	1-102-959-00	CERAMIC	22PF	5%	50V
C526	1-126-157-11	ELECT	10MF	20%	16V
C527	1-161-051-00	CERAMIC	0.01MF	10%	25V
C528	1-102-965-00	CERAMIC	39PF	5%	50V
C529	1-161-051-00	CERAMIC	0.01MF	10%	25V
C530	1-126-157-11	ELECT	10MF	20%	16V
C531	1-126-157-11	ELECT	10MF	20%	16V
C532	1-161-772-11	CERAMIC	0.1MF	10%	25V
C533	1-124-589-11	ELECT	47MF	20%	16V
C534	1-161-051-00	CERAMIC	0.01MF	10%	25V
C535	1-102-953-00	CERAMIC	18PF	5%	50V
C536	1-102-962-00	CERAMIC	30PF	5%	50V
C537	1-124-589-11	ELECT	47MF	20%	16V
C538	1-161-051-00	CERAMIC	0.01MF	10%	25V
C539	1-124-589-11	ELECT	47MF	20%	16V
C540	1-124-589-11	ELECT	47MF	20%	16V
C541	1-102-953-00	CERAMIC	18PF	5%	50V
C542	1-102-962-00	CERAMIC	30PF	5%	50V
C543	1-124-589-11	ELECT	47MF	20%	16V
C544	1-161-051-00	CERAMIC	0.01MF	10%	25V
C545	1-124-589-11	ELECT	47MF	20%	16V
C546	1-124-589-11	ELECT	47MF	20%	16V
C547	1-161-051-00	CERAMIC	0.01MF	10%	25V
C548	1-126-157-11	ELECT	10MF	20%	16V
C701	1-124-455-00	ELECT	100MF	20%	16V
C702	1-161-051-00	CERAMIC	0.01MF	10%	25V
C703	1-124-589-11	ELECT	47MF	20%	16V
C704	1-124-589-11	ELECT	47MF	20%	16V
C705	1-124-589-11	ELECT	47MF	20%	16V
C706	1-124-589-11	ELECT	47MF	20%	16V
C707	1-126-157-11	ELECT	10MF	20%	16V
C708	1-102-951-00	CERAMIC	15PF	5%	50V
C710	1-161-051-00	CERAMIC	0.01MF	10%	25V
C711	1-124-589-11	ELECT	47MF	20%	16V
C712	1-102-947-00	CERAMIC	10PF	0.5PF	50V
C713	1-124-589-11	ELECT	47MF	20%	16V
C714	1-126-157-11	ELECT	10MF	20%	16V
C715	1-124-589-11	ELECT	47MF	20%	16V
C717	1-161-051-00	CERAMIC	0.01MF	10%	25V
C718	1-124-589-11	ELECT	47MF	20%	16V
C719	1-102-947-00	CERAMIC	10PF	0.5PF	50V
C720	1-124-589-11	ELECT	47MF	20%	16V
C721	1-124-589-11	ELECT	47MF	20%	16V
C722	1-124-589-11	ELECT	47MF	20%	16V
C723	1-124-455-00	ELECT	100MF	20%	16V
C724	1-161-051-00	CERAMIC	0.01MF	10%	25V
C727	1-124-455-00	ELECT	100MF	20%	16V
C728	1-124-589-11	ELECT	47MF	20%	16V
C729	1-124-589-11	ELECT	47MF	20%	16V
C730	1-126-157-11	ELECT	10MF	20%	16V
C732	1-161-051-00	CERAMIC	0.01MF	10%	25V
C733	1-102-947-00	CERAMIC	10PF	0.5PF	50V
C734	1-102-952-00	CERAMIC	16PF	5%	50V
C735	1-126-157-11	ELECT	10MF	20%	16V
C737	1-161-051-00	CERAMIC	0.01MF	10%	25V
C738	1-124-589-11	ELECT	47MF	20%	16V
C739	1-102-951-00	CERAMIC	15PF	5%	50V
C740	1-124-455-00	ELECT	100MF	20%	16V
C741	1-102-951-00	CERAMIC	15PF	5%	50V
C742	1-124-589-11	ELECT	47MF	20%	16V
C743	1-124-589-11	ELECT	47MF	20%	16V
C744	1-102-527-11	CERAMIC	82PF	5%	50V

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Ref.No	Part No.	Description			Remark
C745	1-102-953-00	CERAMIC	18PF	5%	50V
C746	1-102-953-00	CERAMIC	18PF	5%	50V
C747	1-124-455-00	ELECT	100MF	20%	16V
C748	1-124-589-11	ELECT	47MF	20%	16V
C749	1-102-958-00	CERAMIC	20PF	5%	50V
C750	1-124-589-11	ELECT	47MF	20%	16V
C751	1-124-589-11	ELECT	47MF	20%	16V
C752	1-102-960-00	CERAMIC	24PF	5%	50V
C753	1-161-051-00	CERAMIC	0.01MF	10%	25V
C754	1-161-051-00	CERAMIC	0.01MF	10%	25V
C755	1-161-051-00	CERAMIC	0.01MF	10%	25V
C756	1-161-051-00	CERAMIC	0.01MF	10%	25V
C757	1-161-051-00	CERAMIC	0.01MF	10%	25V
C759	1-161-051-00	CERAMIC	0.01MF	10%	25V
C760	1-161-051-00	CERAMIC	0.01MF	10%	25V
C761	1-161-051-01	CERAMIC	0.01MF	10%	25V
C762	1-124-589-11	ELECT	47MF	20%	16V
C763	1-161-051-00	CERAMIC	0.01MF	10%	25V
C764	1-124-589-11	ELECT	47MF	20%	16V
C765	1-124-455-00	ELECT	100MF	20%	16V
C766	1-124-589-11	ELECT	47MF	20%	16V
C767	1-161-051-00	CERAMIC	0.01MF	10%	25V
C768	1-124-455-00	ELECT	100MF	20%	16V
C769	1-161-051-00	CERAMIC	0.01MF	10%	25V
C770	1-124-455-00	ELECT	100MF	20%	16V
C771	1-161-051-00	CERAMIC	0.01MF	10%	25V
C772	1-126-157-11	ELECT	10MF	20%	16V
C773	1-161-051-00	CERAMIC	0.01MF	10%	25V
C774	1-124-455-00	ELECT	100MF	20%	16V
C775	1-161-051-00	CERAMIC	0.01MF	10%	25V
C776	1-124-455-00	ELECT	100MF	20%	16V
C777	1-161-051-00	CERAMIC	0.01MF	10%	25V
C778	1-124-589-11	ELECT	47MF	20%	16V
C779	1-161-051-00	CERAMIC	0.01MF	10%	25V
C780	1-124-589-11	ELECT	47MF	20%	16V
C782	1-124-589-11	ELECT	47MF	20%	16V
C783	1-124-589-11	ELECT	47MF	20%	16V
C784	1-161-051-00	CERAMIC	0.01MF	10%	25V
C785	1-124-589-11	ELECT	47MF	20%	16V
C787	1-124-589-11	ELECT	47MF	20%	16V
C788	1-124-589-11	ELECT	47MF	20%	16V
C789	1-161-051-00	CERAMIC	0.01MF	10%	25V
C790	1-124-589-11	ELECT	47MF	20%	16V
C792	1-124-589-11	ELECT	47MF	20%	16V
C793	1-124-589-11	ELECT	47MF	20%	16V
C794	1-124-589-11	ELECT	47MF	20%	16V
C795	1-126-163-11	ELECT	4.7MF	20%	25V
C796	1-102-973-00	CERAMIC	100PF	5%	50V
C901	1-161-051-00	CERAMIC	0.01MF	10%	25V
C902	1-161-051-00	CERAMIC	0.01MF	10%	25V
C903	1-124-589-11	ELECT	47MF	20%	16V
C904	1-161-051-00	CERAMIC	0.01MF	10%	25V
		<CERAMIC, FILTER>			
CF501	1-231-280-00	FILTER, CERAMIC 4.43MHz			
		<CONNECTOR>			
CN101	1-506-468-11	PIN, CONNECTOR 3P			
CN102	1-506-469-11	PIN, CONNECTOR 4P			
CN103	1-506-468-11	PIN, CONNECTOR 3P			
CN104	1-506-469-11	PIN, CONNECTOR 4P			

Ref.No	Part No.	Description	Remark
CN105	1-506-471-11	PIN, CONNECTOR 6P	
CN106	1-506-473-11	PIN, CONNECTOR 8P	
CN107	1-506-473-11	PIN, CONNECTOR 8P	
CN201	1-506-470-11	PIN, CONNECTOR 5P	
CN202	1-506-468-11	PIN, CONNECTOR 3P	
CN501	1-506-469-11	PIN, CONNECTOR 4P	
CN701	1-506-472-11	PIN, CONNECTOR 7P	
CN702	1-506-468-11	PIN, CONNECTOR 3P	
CN703	1-506-471-11	PIN, CONNECTOR 6P	
CN704	1-506-473-11	PIN, CONNECTOR 8P	
		<DIODE>	
D101	8-719-000-06	DIODE MC921	
D102	8-719-911-19	DIODE 1SS119	
D103	8-719-911-19	DIODE 1SS119	
D301	8-719-911-19	DIODE 1SS119	
D701	8-719-911-19	DIODE 1SS119	
D702	8-719-911-19	DIODE 1SS119	
D703	8-719-911-19	DIODE 1SS119	
D704	8-719-911-19	DIODE 1SS119	
D901	8-719-911-19	DIODE 1SS119	
D902	8-719-911-19	DIODE 1SS119	
D903	8-719-911-19	DIODE 1SS119	
D904	8-719-911-19	DIODE 1SS119	
D905	8-719-911-19	DIODE 1SS119	
D906	8-719-911-19	DIODE 1SS119	
D907	8-719-911-19	DIODE 1SS119	
D908	8-719-911-19	DIODE 1SS119	
D909	8-719-100-12	DIODE RD2.7EB1	
D910	8-719-100-12	DIODE RD2.7EB1	
		<DELAY LINE>	
DL101	1-415-309-00	DELAY LINE	
DL501	1-415-122-91	DELAY LINE, 1H (PAL)	
DL701	1-415-348-21	DELAY LINE	
		<FERRITE, BEAD>	
FB901	1-543-255-11	BEAD, FERRITE	
FB902	1-543-255-11	BEAD, FERRITE	
FB903	1-543-255-11	BEAD, FERRITE	
FB904	1-543-255-11	BEAD, FERRITE	
FB905	1-543-255-11	BEAD, FERRITE	
FB906	1-543-255-11	BEAD, FERRITE	
FB907	1-543-255-11	BEAD, FERRITE	
FB908	1-543-255-11	BEAD, FERRITE	
FB909	1-543-255-11	BEAD, FERRITE	
FB910	1-543-255-11	BEAD, FERRITE	
FB911	1-543-255-11	BEAD, FERRITE	
FB912	1-543-255-11	BEAD, FERRITE	
FB913	1-543-255-11	BEAD, FERRITE	
FB914	1-543-255-11	BEAD, FERRITE	
FB915	1-543-255-11	BEAD, FERRITE	
FB916	1-543-255-11	BEAD, FERRITE	
FB917	1-543-255-11	BEAD, FERRITE	
FB918	1-543-255-11	BEAD, FERRITE	
		<FILTER>	
FL301	1-236-508-11	FILTER, LOW PASS	
FL302	1-235-439-11	FILTER, BAND PASS (4.43MHz)	
FL701	1-235-899-11	FILTER, LOW PASS	
FL702	1-235-899-11	FILTER, LOW PASS	

Ref.No	Part No.	Description	Remark
		<IC>	
IC101	8-759-300-71	IC HD14053BFP	
IC102	8-759-300-71	IC HD14053BFP	
IC301	8-752-334-55	IC CXD1175AM	
IC302	8-752-342-61	IC CXD2105AQ	
IC303	8-759-708-05	IC NJM78L05A	
IC304	8-759-708-05	IC NJM78L05A	
IC501	8-759-708-05	IC NJM78L05A	
IC502	8-752-033-32	IC CXA1228S	
IC701	8-759-300-71	IC HD14053BFP	
IC702	8-759-300-71	IC HD14053BFP	
		<INDUCTOR>	
L101	1-408-421-00	INDUCTOR 100UH	
L102	1-408-414-00	INDUCTOR 27UH	
L103	1-408-417-00	INDUCTOR 47UH	
L104	1-408-409-00	INDUCTOR 10UH	
L105	1-408-421-00	INDUCTOR 100UH	
L106	1-408-415-00	INDUCTOR 33UH	
L107	1-408-421-00	INDUCTOR 100UH	
L108	1-408-415-00	INDUCTOR 33UH	
L301	1-408-421-00	INDUCTOR 100UH	
L302	1-408-405-00	INDUCTOR 4.7UH	
L303	1-408-417-00	INDUCTOR 47UH	
L304	1-408-417-00	INDUCTOR 47UH	
L305	1-408-417-00	INDUCTOR 47UH	
L306	1-408-421-00	INDUCTOR 100UH	
L308	1-408-415-00	INDUCTOR 33UH	
L311	1-408-421-00	INDUCTOR 100UH	
L501	1-408-408-00	INDUCTOR 8.2UH	
L502	1-408-421-00	INDUCTOR 100UH	
L503	1-408-411-00	INDUCTOR 15UH	
L504	1-408-416-00	INDUCTOR 39UH	
L505	1-408-411-00	INDUCTOR 15UH	
L506	1-408-416-00	INDUCTOR 39UH	
L701	1-408-421-00	INDUCTOR 100UH	
L703	1-408-414-00	INDUCTOR 27UH	
L704	1-408-417-00	INDUCTOR 47UH	
L705	1-408-421-00	INDUCTOR 100UH	
L706	1-408-421-00	INDUCTOR 100UH	
L707	1-408-421-00	INDUCTOR 100UH	
L708	1-408-421-00	INDUCTOR 100UH	
L709	1-408-421-00	INDUCTOR 100UH	
L710	1-408-421-00	INDUCTOR 100UH	
L711	1-408-421-00	INDUCTOR 100UH	
L712	1-408-421-00	INDUCTOR 100UH	
L713	1-408-421-00	INDUCTOR 100UH	
		<TRANSISTOR>	
Q101	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q102	8-729-900-89	TRANSISTOR DTC144ES	
Q103	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q104	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q105	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q106	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q107	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q108	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q109	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q111	8-729-119-78	TRANSISTOR 2SC2785-HFE	

Ref.No	Part No.	Description	Remark
Q112	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q113	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q114	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q115	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q116	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q117	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q118	8-729-900-89	TRANSISTOR DTC144ES	
Q119	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q120	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q121	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q122	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q123	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q124	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q125	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q126	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q127	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q128	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q129	8-729-900-65	TRANSISTOR DTA144ES	
Q301	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q302	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q303	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q304	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q305	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q306	8-729-141-30	TRANSISTOR 2SC3623A-LK	
Q307	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q308	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q309	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q310	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q311	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q312	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q313	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q314	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q315	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q316	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q317	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q318	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q319	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q501	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q502	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q503	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q504	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q505	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q506	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q507	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q508	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q509	8-729-900-89	TRANSISTOR DTC144ES	
Q510	8-729-900-89	TRANSISTOR DTC144ES	
Q511	8-729-900-89	TRANSISTOR DTC144ES	
Q512	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q513	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q514	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q515	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q516	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q517	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q518	8-729-900-89	TRANSISTOR DTC144ES	
Q519	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q520	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q521	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q522	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q523	8-729-119-78	TRANSISTOR 2SC2785-HFE	

Ref.No	Part No.	Description			Remark
Q524	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q701	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q702	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q703	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q704	8-729-119-76	TRANSISTOR 2SA1175-HFE			
Q705	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q706	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q707	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q708	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q709	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q710	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q711	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q712	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q713	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q714	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q715	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q716	8-729-119-76	TRANSISTOR 2SA1175-HFE			
Q717	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q718	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q719	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q720	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q721	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q724	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q725	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q726	8-729-119-76	TRANSISTOR 2SA1175-HFE			
Q727	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q728	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q729	8-729-119-76	TRANSISTOR 2SA1175-HFE			
Q730	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q731	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q732	8-729-119-76	TRANSISTOR 2SA1175-HFE			
Q733	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q734	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q735	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q736	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q737	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q738	8-729-900-89	TRANSISTOR DTC144ES			
Q739	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q740	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q741	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q742	8-729-900-89	TRANSISTOR DTC144ES			
Q743	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q744	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q745	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q746	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q747	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q748	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q749	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q750	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q751	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q752	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q753	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q754	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q755	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q901	8-729-201-05	TRANSISTOR 2SC2878B			
Q902	8-729-201-05	TRANSISTOR 2SC2878B			
		<RESISTOR>			
R102	1-249-430-11	CARBON	12K	5%	1/4W

Ref.No	Part No.	Description			Remark
R103	1-249-434-11	CARBON	27K	5%	1/4W
R104	1-249-420-11	CARBON	1.8K	5%	1/4W
R105	1-249-425-11	CARBON	4.7K	5%	1/4W
R106	1-249-429-11	CARBON	10K	5%	1/4W
R107	1-249-429-11	CARBON	10K	5%	1/4W
R108	1-249-422-11	CARBON	2.7K	5%	1/4W
R109	1-249-437-11	CARBON	47K	5%	1/4W
R110	1-249-421-11	CARBON	2.2K	5%	1/4W
R111	1-249-417-11	CARBON	1K	5%	1/4W
R112	1-249-417-11	CARBON	1K	5%	1/4W
R113	1-249-424-11	CARBON	3.9K	5%	1/4W
R114	1-249-417-11	CARBON	1K	5%	1/4W
R115	1-249-417-11	CARBON	1K	5%	1/4W
R116	1-215-427-00	METAL	1.8K	1%	1/4W
R117	1-215-385-00	METAL	33	1%	1/4W
R118	1-249-417-11	CARBON	1K	5%	1/4W
R119	1-249-417-11	CARBON	1K	5%	1/4W
R120	1-215-426-00	METAL	1.6K	1%	1/4W
R121	1-215-391-00	METAL	56	1%	1/4W
R122	1-249-409-11	CARBON	220	5%	1/4W
R123	1-249-424-11	CARBON	3.9K	5%	1/4W
R124	1-249-398-11	CARBON	27	5%	1/4W
R125	1-249-417-11	CARBON	1K	5%	1/4W
R126	1-249-431-11	CARBON	15K	5%	1/4W
R127	1-249-433-11	CARBON	22K	5%	1/4W
R128	1-249-416-11	CARBON	820	5%	1/4W
R129	1-249-413-11	CARBON	470	5%	1/4W
R130	1-249-405-11	CARBON	100	5%	1/4W
R131	1-249-417-11	CARBON	1K	5%	1/4W
R132	1-249-417-11	CARBON	1K	5%	1/4W
R133	1-249-431-11	CARBON	15K	5%	1/4W
R134	1-249-433-11	CARBON	22K	5%	1/4W
R135	1-249-416-11	CARBON	820	5%	1/4W
R136	1-249-409-11	CARBON	220	5%	1/4W
R137	1-215-394-00	METAL	75	1%	1/4W
R138	1-249-432-11	CARBON	18K	5%	1/4W
R139	1-249-433-11	CARBON	22K	5%	1/4W
R140	1-249-420-11	CARBON	1.8K	5%	1/4W
R141	1-249-417-11	CARBON	1K	5%	1/4W
R142	1-249-419-11	CARBON	1.5K	5%	1/4W
R143	1-249-417-11	CARBON	1K	5%	1/4W
R144	1-215-394-00	METAL	75	1%	1/4W
R145	1-249-393-11	CARBON	10	5%	1/4W
R146	1-249-430-11	CARBON	12K	5%	1/4W
R147	1-249-434-11	CARBON	27K	5%	1/4W
R148	1-249-411-11	CARBON	330	5%	1/4W
R149	1-249-410-11	CARBON	270	5%	1/4W
R150	1-249-413-11	CARBON	470	5%	1/4W
R151	1-249-421-11	CARBON	2.2K	5%	1/4W
R152	1-249-421-11	CARBON	2.2K	5%	1/4W
R153	1-249-441-11	CARBON	100K	5%	1/4W
R155	1-249-433-11	CARBON	22K	5%	1/4W
R156	1-249-428-11	CARBON	8.2K	5%	1/4W
R157	1-249-441-11	CARBON	100K	5%	1/4W
R159	1-247-814-11	CARBON	200	5%	1/4W
R160	1-249-423-11	CARBON	3.3K	5%	1/4W
R161	1-249-421-11	CARBON	2.2K	5%	1/4W
R162	1-247-814-11	CARBON	200	5%	1/4W
R163	1-249-417-11	CARBON	1K	5%	1/4W
R164	1-249-417-11	CARBON	1K	5%	1/4W

Ref.No	Part No.	Description				Remark
R165	1-249-437-11	CARBON	47K	5%	1/4W	
R166	1-215-414-00	METAL	510	1%	1/4W	
R167	1-215-391-00	METAL	56	1%	1/4W	
R168	1-249-417-11	CARBON	1K	5%	1/4W	
R169	1-249-417-11	CARBON	1K	5%	1/4W	
R170	1-249-424-11	CARBON	3.9K	5%	1/4W	
R171	1-249-429-11	CARBON	10K	5%	1/4W	
R172	1-249-429-11	CARBON	10K	5%	1/4W	
R173	1-249-425-11	CARBON	4.7K	5%	1/4W	
R174	1-215-424-00	METAL	1.3K	1%	1/4W	
R175	1-215-407-00	METAL	270	1%	1/4W	
R176	1-249-421-11	CARBON	2.2K	5%	1/4W	
R177	1-249-430-11	CARBON	12K	5%	1/4W	
R178	1-249-431-11	CARBON	15K	5%	1/4W	
R179	1-249-422-11	CARBON	2.7K	5%	1/4W	
R180	1-249-415-11	CARBON	680	5%	1/4W	
R181	1-249-397-11	CARBON	22	5%	1/4W	
R182	1-249-417-11	CARBON	1K	5%	1/4W	
R183	1-249-417-11	CARBON	1K	5%	1/4W	
R184	1-249-430-11	CARBON	12K	5%	1/4W	
R185	1-249-431-11	CARBON	15K	5%	1/4W	
R186	1-249-416-11	CARBON	820	5%	1/4W	
R187	1-249-423-11	CARBON	3.3K	5%	1/4W	
R188	1-249-417-11	CARBON	1K	5%	1/4W	
R189	1-249-417-11	CARBON	1K	5%	1/4W	
R190	1-247-826-00	CARBON	620	5%	1/4W	
R191	1-249-423-11	CARBON	3.3K	5%	1/4W	
R301	1-249-436-11	CARBON	39K	5%	1/4W	
R302	1-249-429-11	CARBON	10K	5%	1/4W	
R303	1-249-422-11	CARBON	2.7K	5%	1/4W	
R304	1-249-418-11	CARBON	1.2K	5%	1/4W	
R305	1-249-410-11	CARBON	270	5%	1/4W	
R306	1-249-399-11	CARBON	33	5%	1/4W	
R307	1-249-413-11	CARBON	470	5%	1/4W	
R308	1-249-413-11	CARBON	470	5%	1/4W	
R309	1-249-413-11	CARBON	470	5%	1/4W	
R310	1-249-419-11	CARBON	1.5K	5%	1/4W	
R311	1-249-393-11	CARBON	10	5%	1/4W	
R312	1-249-404-00	CARBON	82	5%	1/4W	
R313	1-249-433-11	CARBON	22K	5%	1/4W	
R314	1-249-433-11	CARBON	22K	5%	1/4W	
R315	1-247-903-00	CARBON	1M	5%	1/4W	
R316	1-249-425-11	CARBON	4.7K	5%	1/4W	
R317	1-249-410-11	CARBON	270	5%	1/4W	
R318	1-249-409-11	CARBON	220	5%	1/4W	
R319	1-249-423-11	CARBON	3.3K	5%	1/4W	
R320	1-249-423-11	CARBON	3.3K	5%	1/4W	
R321	1-249-423-11	CARBON	3.3K	5%	1/4W	
R322	1-249-418-11	CARBON	1.2K	5%	1/4W	
R323	1-249-409-11	CARBON	220	5%	1/4W	
R324	1-249-433-11	CARBON	22K	5%	1/4W	
R325	1-249-430-11	CARBON	12K	5%	1/4W	
R326	1-249-417-11	CARBON	1K	5%	1/4W	
R327	1-249-413-11	CARBON	470	5%	1/4W	
R328	1-249-413-11	CARBON	470	5%	1/4W	
R330	1-249-433-11	CARBON	22K	5%	1/4W	
R331	1-249-430-11	CARBON	12K	5%	1/4W	
R332	1-249-417-11	CARBON	1K	5%	1/4W	
R333	1-249-417-11	CARBON	1K	5%	1/4W	
R334	1-215-411-00	METAL	390	1%	1/4W	

Ref.No	Part No.	Description				Remark
R335	1-215-397-00	METAL	100	1%	1/4W	
R336	1-249-417-11	CARBON	1K	5%	1/4W	
R337	1-249-417-11	CARBON	1K	5%	1/4W	
R338	1-215-426-00	METAL	1.6K	1%	1/4W	
R339	1-215-403-00	METAL	180	1%	1/4W	
R340	1-249-422-11	CARBON	2.7K	5%	1/4W	
R341	1-249-405-11	CARBON	100	5%	1/4W	
R343	1-249-417-11	CARBON	1K	5%	1/4W	
R346	1-249-432-11	CARBON	18K	5%	1/4W	
R347	1-249-430-11	CARBON	12K	5%	1/4W	
R348	1-249-416-11	CARBON	820	5%	1/4W	
R349	1-249-405-11	CARBON	100	5%	1/4W	
R351	1-247-830-11	CARBON	910	5%	1/4W	
R352	1-247-830-11	CARBON	910	5%	1/4W	
R353	1-249-432-11	CARBON	18K	5%	1/4W	
R354	1-249-430-11	CARBON	12K	5%	1/4W	
R355	1-249-416-11	CARBON	820	5%	1/4W	
R356	1-249-405-11	CARBON	100	5%	1/4W	
R358	1-249-416-11	CARBON	820	5%	1/4W	
R359	1-249-433-11	CARBON	22K	5%	1/4W	
R360	1-249-430-11	CARBON	12K	5%	1/4W	
R361	1-249-417-11	CARBON	1K	5%	1/4W	
R362	1-247-830-11	CARBON	910	5%	1/4W	
R363	1-249-417-11	CARBON	1K	5%	1/4W	
R364	1-249-433-11	CARBON	22K	5%	1/4W	
R365	1-249-430-11	CARBON	12K	5%	1/4W	
R366	1-249-417-11	CARBON	1K	5%	1/4W	
R367	1-249-417-11	CARBON	1K	5%	1/4W	
R368	1-215-409-00	METAL	330	1%	1/4W	
R369	1-215-395-00	METAL	82	1%	1/4W	
R370	1-249-416-11	CARBON	820	5%	1/4W	
R371	1-249-411-11	CARBON	330	5%	1/4W	
R372	1-249-417-11	CARBON	1K	5%	1/4W	
R501	1-249-433-11	CARBON	22K	5%	1/4W	
R502	1-249-433-11	CARBON	22K	5%	1/4W	
R503	1-249-413-11	CARBON	470	5%	1/4W	
R504	1-249-414-11	CARBON	560	5%	1/4W	
R505	1-247-893-11	CARBON	390K	5%	1/4W	
R506	1-247-885-00	CARBON	180K	5%	1/4W	
R507	1-249-433-11	CARBON	22K	5%	1/4W	
R509	1-249-421-11	CARBON	2.2K	5%	1/4W	
R510	1-249-421-11	CARBON	2.2K	5%	1/4W	
R511	1-249-417-11	CARBON	1K	5%	1/4W	
R513	1-249-412-11	CARBON	390	5%	1/4W	
R515	1-249-412-11	CARBON	390	5%	1/4W	
R517	1-247-846-11	CARBON	4.3K	5%	1/4W	
R518	1-249-432-11	CARBON	18K	5%	1/4W	
R520	1-249-416-11	CARBON	820	5%	1/4W	
R521	1-249-420-11	CARBON	1.8K	5%	1/4W	
R522	1-249-429-11	CARBON	10K	5%	1/4W	
R523	1-249-431-11	CARBON	15K	5%	1/4W	
R524	1-249-405-11	CARBON	100	5%	1/4W	
R525	1-249-417-11	CARBON	1K	5%	1/4W	
R526	1-249-417-11	CARBON	1K	5%	1/4W	
R527	1-249-417-11	CARBON	1K	5%	1/4W	
R528	1-249-431-11	CARBON	15K	5%	1/4W	
R529	1-249-427-11	CARBON	6.8K	5%	1/4W	
R530	1-249-417-11	CARBON	1K	5%	1/4W	
R531	1-249-421-11	CARBON	2.2K	5%	1/4W	
R532	1-249-417-11	CARBON	1K	5%	1/4W	
R533	1-249-431-11	CARBON	15K	5%	1/4W	

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Ref.No	Part No.	Description			Remark
R534	1-249-427-11	CARBON	6.8K	5%	1/4W
R535	1-249-416-11	CARBON	820	5%	1/4W
R536	1-215-436-00	METAL	4.3K	1%	1/4W
R537	1-215-443-00	METAL	8.2K	1%	1/4W
R538	1-249-429-11	CARBON	10K	5%	1/4W
R539	1-247-903-00	CARBON	1M	5%	1/4W
R540	1-249-425-11	CARBON	4.7K	5%	1/4W
R541	1-249-421-11	CARBON	2.2K	5%	1/4W
R542	1-249-417-11	CARBON	1K	5%	1/4W
R543	1-249-417-11	CARBON	1K	5%	1/4W
R544	1-249-424-11	CARBON	3.9K	5%	1/4W
R545	1-249-417-11	CARBON	1K	5%	1/4W
R546	1-249-397-11	CARBON	22	5%	1/4W
R547	1-249-423-11	CARBON	3.3K	5%	1/4W
R548	1-249-417-11	CARBON	1K	5%	1/4W
R549	1-249-397-11	CARBON	22	5%	1/4W
R550	1-249-417-11	CARBON	1K	5%	1/4W
R551	1-249-433-11	CARBON	22K	5%	1/4W
R552	1-249-431-11	CARBON	15K	5%	1/4W
R553	1-249-416-11	CARBON	820	5%	1/4W
R554	1-249-409-11	CARBON	220	5%	1/4W
R555	1-249-417-11	CARBON	1K	5%	1/4W
R556	1-249-417-11	CARBON	1K	5%	1/4W
R557	1-249-433-11	CARBON	22K	5%	1/4W
R558	1-249-431-11	CARBON	15K	5%	1/4W
R559	1-249-422-11	CARBON	2.7K	5%	1/4W
R560	1-249-417-11	CARBON	1K	5%	1/4W
R561	1-249-417-11	CARBON	1K	5%	1/4W
R562	1-249-424-11	CARBON	3.9K	5%	1/4W
R563	1-249-417-11	CARBON	1K	5%	1/4W
R564	1-249-397-11	CARBON	22	5%	1/4W
R565	1-249-423-11	CARBON	3.3K	5%	1/4W
R566	1-249-417-11	CARBON	1K	5%	1/4W
R567	1-249-397-11	CARBON	22	5%	1/4W
R568	1-249-417-11	CARBON	1K	5%	1/4W
R569	1-249-433-11	CARBON	22K	5%	1/4W
R570	1-249-431-11	CARBON	15K	5%	1/4W
R571	1-249-416-11	CARBON	820	5%	1/4W
R572	1-249-409-11	CARBON	220	5%	1/4W
R573	1-249-417-11	CARBON	1K	5%	1/4W
R574	1-249-417-11	CARBON	1K	5%	1/4W
R575	1-249-433-11	CARBON	22K	5%	1/4W
R576	1-249-431-11	CARBON	15K	5%	1/4W
R577	1-249-422-11	CARBON	2.7K	5%	1/4W
R578	1-247-889-00	CARBON	270K	5%	1/4W
R579	1-249-413-11	CARBON	470	5%	1/4W
R701	1-215-394-00	METAL	75	1%	1/4W
R702	1-215-394-00	METAL	75	1%	1/4W
R703	1-249-429-11	CARBON	10K	5%	1/4W
R704	1-249-433-11	CARBON	22K	5%	1/4W
R705	1-249-429-11	CARBON	10K	5%	1/4W
R706	1-249-433-11	CARBON	22K	5%	1/4W
R707	1-249-417-11	CARBON	1K	5%	1/4W
R708	1-216-731-11	METAL	2.47K	0.10%	1/8W
R709	1-249-417-11	CARBON	1K	5%	1/4W
R710	1-216-729-11	METAL	12.45	0.10%	1/8W
R711	1-216-730-11	METAL	4.77K	0.10%	1/8W
R712	1-215-419-00	METAL	820	1%	1/4W
R713	1-249-430-11	CARBON	12K	5%	1/4W
R714	1-249-433-11	CARBON	22K	5%	1/4W

Ref.No	Part No.	Description			Remark
R715	1-215-419-00	METAL	820	1%	1/4W
R716	1-249-417-11	CARBON	1K	5%	1/4W
R717	1-249-413-11	CARBON	470	5%	1/4W
R718	1-249-416-11	CARBON	820	5%	1/4W
R719	1-249-417-11	CARBON	1K	5%	1/4W
R720	1-249-429-11	CARBON	10K	5%	1/4W
R721	1-249-433-11	CARBON	22K	5%	1/4W
R722	1-249-421-11	CARBON	2.2K	5%	1/4W
R723	1-249-419-11	CARBON	1.5K	5%	1/4W
R724	1-249-417-11	CARBON	1K	5%	1/4W
R725	1-249-417-11	CARBON	1K	5%	1/4W
R726	1-215-394-00	METAL	75	1%	1/4W
R727	1-249-429-11	CARBON	10K	5%	1/4W
R728	1-249-433-11	CARBON	22K	5%	1/4W
R729	1-249-417-11	CARBON	1K	5%	1/4W
R730	1-249-417-11	CARBON	1K	5%	1/4W
R731	1-249-424-11	CARBON	3.9K	5%	1/4W
R732	1-215-426-00	METAL	1.6K	1%	1/4W
R733	1-249-417-11	CARBON	1K	5%	1/4W
R734	1-249-411-11	CARBON	330	5%	1/4W
R735	1-249-417-11	CARBON	1K	5%	1/4W
R736	1-215-426-00	METAL	1.6K	1%	1/4W
R737	1-249-402-11	CARBON	56	5%	1/4W
R738	1-249-416-11	CARBON	820	5%	1/4W
R739	1-249-417-11	CARBON	1K	5%	1/4W
R740	1-249-429-11	CARBON	10K	5%	1/4W
R741	1-249-433-11	CARBON	22K	5%	1/4W
R742	1-249-419-11	CARBON	1.5K	5%	1/4W
R743	1-249-431-11	CARBON	15K	5%	1/4W
R744	1-249-433-11	CARBON	22K	5%	1/4W
R745	1-249-416-11	CARBON	820	5%	1/4W
R746	1-249-417-11	CARBON	1K	5%	1/4W
R747	1-249-417-11	CARBON	1K	5%	1/4W
R748	1-249-417-11	CARBON	1K	5%	1/4W
R749	1-249-417-11	CARBON	1K	5%	1/4W
R750	1-249-431-11	CARBON	15K	5%	1/4W
R751	1-249-433-11	CARBON	22K	5%	1/4W
R752	1-249-422-11	CARBON	2.7K	5%	1/4W
R753	1-249-417-11	CARBON	1K	5%	1/4W
R754	1-249-424-11	CARBON	3.9K	5%	1/4W
R755	1-249-417-11	CARBON	1K	5%	1/4W
R756	1-249-411-11	CARBON	330	5%	1/4W
R757	1-249-417-11	CARBON	1K	5%	1/4W
R758	1-249-419-11	CARBON	1.5K	5%	1/4W
R759	1-249-431-11	CARBON	15K	5%	1/4W
R760	1-249-433-11	CARBON	22K	5%	1/4W
R761	1-249-416-11	CARBON	820	5%	1/4W
R762	1-249-417-11	CARBON	1K	5%	1/4W
R763	1-249-417-11	CARBON	1K	5%	1/4W
R764	1-249-431-11	CARBON	15K	5%	1/4W
R765	1-249-433-11	CARBON	22K	5%	1/4W
R766	1-249-422-11	CARBON	2.7K	5%	1/4W
R767	1-215-394-00	METAL	75	1%	1/4W
R768	1-249-421-11	CARBON	2.2K	5%	1/4W
R769	1-249-422-11	CARBON	2.7K	5%	1/4W
R774	1-249-441-11	CARBON	100K	5%	1/4W
R776	1-249-433-11	CARBON	22K	5%	1/4W
R777	1-249-433-11	CARBON	22K	5%	1/4W
R778	1-249-441-11	CARBON	100K	5%	1/4W
R781	1-249-409-11	CARBON	220	5%	1/4W

Ref.No	Part No.	Description				Remark
R782	1-249-423-11	CARBON	3.3K	5%	1/4W	
R785	1-249-421-11	CARBON	2.2K	5%	1/4W	
R786	1-249-419-11	CARBON	1.5K	5%	1/4W	
R787	1-249-409-11	CARBON	220	5%	1/4W	
R788	1-249-429-11	CARBON	10K	5%	1/4W	
R789	1-249-433-11	CARBON	22K	5%	1/4W	
R790	1-249-417-11	CARBON	1K	5%	1/4W	
R791	1-249-417-11	CARBON	1K	5%	1/4W	
R792	1-249-412-11	CARBON	390	5%	1/4W	
R793	1-249-405-11	CARBON	100	5%	1/4W	
R794	1-249-420-11	CARBON	1.8K	5%	1/4W	
R795	1-249-417-11	CARBON	1K	5%	1/4W	
R796	1-249-417-11	CARBON	1K	5%	1/4W	
R797	1-249-425-11	CARBON	4.7K	5%	1/4W	
R798	1-249-423-11	CARBON	3.3K	5%	1/4W	
R799	1-249-429-11	CARBON	10K	5%	1/4W	
R801	1-215-428-00	METAL	2K	1%	1/4W	
R802	1-249-430-11	CARBON	12K	5%	1/4W	
R803	1-249-432-11	CARBON	18K	5%	1/4W	
R804	1-249-413-11	CARBON	470	5%	1/4W	
R805	1-249-403-11	CARBON	68	5%	1/4W	
R806	1-249-397-11	CARBON	22	5%	1/4W	
R807	1-249-417-11	CARBON	1K	5%	1/4W	
R808	1-249-424-11	CARBON	3.9K	5%	1/4W	
R809	1-249-417-11	CARBON	1K	5%	1/4W	
R810	1-249-418-11	CARBON	1.2K	5%	1/4W	
R811	1-249-417-11	CARBON	1K	5%	1/4W	
R812	1-249-417-11	CARBON	1K	5%	1/4W	
R813	1-215-424-00	METAL	1.3K	1%	1/4W	
R814	1-249-423-11	CARBON	3.3K	5%	1/4W	
R815	1-249-430-11	CARBON	12K	5%	1/4W	
R816	1-249-432-11	CARBON	18K	5%	1/4W	
R817	1-215-383-00	METAL	27	1%	1/4W	
R818	1-249-416-11	CARBON	820	5%	1/4W	
R819	1-249-417-11	CARBON	1K	5%	1/4W	
R820	1-249-417-11	CARBON	1K	5%	1/4W	
R821	1-249-423-11	CARBON	3.3K	5%	1/4W	
R822	1-249-429-11	CARBON	10K	5%	1/4W	
R823	1-249-429-11	CARBON	10K	5%	1/4W	
R824	1-215-428-00	METAL	2K	1%	1/4W	
R825	1-215-426-00	METAL	1.6K	1%	1/4W	
R826	1-215-402-00	METAL	160	1%	1/4W	
R827	1-249-424-11	CARBON	3.9K	5%	1/4W	
R828	1-249-437-11	CARBON	47K	5%	1/4W	
R829	1-249-423-11	CARBON	3.3K	5%	1/4W	
R830	1-249-402-11	CARBON	56	5%	1/4W	
R831	1-249-429-11	CARBON	10K	5%	1/4W	
R832	1-249-423-11	CARBON	3.3K	5%	1/4W	
R833	1-249-423-11	CARBON	3.3K	5%	1/4W	
R834	1-249-437-11	CARBON	47K	5%	1/4W	
R835	1-249-423-11	CARBON	3.3K	5%	1/4W	
R836	1-249-435-11	CARBON	33K	5%	1/4W	
R837	1-249-431-11	CARBON	15K	5%	1/4W	
R838	1-249-417-11	CARBON	1K	5%	1/4W	
R840	1-249-417-11	CARBON	1K	5%	1/4W	
R841	1-249-417-11	CARBON	1K	5%	1/4W	
R842	1-249-435-11	CARBON	33K	5%	1/4W	
R843	1-249-431-11	CARBON	15K	5%	1/4W	
R844	1-249-422-11	CARBON	2.7K	5%	1/4W	
R845	1-249-435-11	CARBON	33K	5%	1/4W	
R846	1-249-431-11	CARBON	15K	5%	1/4W	

Ref.No	Part No.	Description				Remark
R847	1-249-417-11	CARBON	1K	5%	1/4W	
R849	1-249-417-11	CARBON	1K	5%	1/4W	
R850	1-249-435-11	CARBON	33K	5%	1/4W	
R851	1-249-417-11	CARBON	1K	5%	1/4W	
R852	1-249-431-11	CARBON	15K	5%	1/4W	
R853	1-249-422-11	CARBON	2.7K	5%	1/4W	
R854	1-249-435-11	CARBON	33K	5%	1/4W	
R855	1-249-431-11	CARBON	15K	5%	1/4W	
R856	1-249-417-11	CARBON	1K	5%	1/4W	
R858	1-249-417-11	CARBON	1K	5%	1/4W	
R859	1-249-435-11	CARBON	33K	5%	1/4W	
R860	1-249-417-11	CARBON	1K	5%	1/4W	
R861	1-249-431-11	CARBON	15K	5%	1/4W	
R862	1-249-422-11	CARBON	2.7K	5%	1/4W	
R863	1-249-429-11	CARBON	10K	5%	1/4W	
R864	1-249-429-11	CARBON	10K	5%	1/4W	
R865	1-249-417-11	CARBON	1K	5%	1/4W	
R866	1-249-417-11	CARBON	1K	5%	1/4W	
R867	1-249-406-11	CARBON	120	5%	1/4W	
R868	1-249-419-11	CARBON	1.5K	5%	1/4W	
R869	1-249-433-11	CARBON	22K	5%	1/4W	
R870	1-249-432-11	CARBON	18K	5%	1/4W	
R871	1-249-423-11	CARBON	3.3K	5%	1/4W	
R872	1-249-425-11	CARBON	4.7K	5%	1/4W	
R873	1-249-435-11	CARBON	33K	5%	1/4W	
R901	1-249-393-11	CARBON	10	5%	1/4W	
R902	1-249-393-11	CARBON	10	5%	1/4W	
R903	1-249-393-11	CARBON	10	5%	1/4W	
R904	1-249-393-11	CARBON	10	5%	1/4W	
R905	1-249-393-11	CARBON	10	5%	1/4W	
R906	1-249-393-11	CARBON	10	5%	1/4W	
R907	1-249-393-11	CARBON	10	5%	1/4W	
R908	1-249-393-11	CARBON	10	5%	1/4W	
R909	1-249-417-11	CARBON	1K	5%	1/4W	
R910	1-249-417-11	CARBON	1K	5%	1/4W	
R911	1-249-405-11	CARBON	100	5%	1/4W	
R912	1-215-393-00	METAL	68	1%	1/4W	
R913	1-249-389-11	CARBON	4.7	5%	1/4W	
R914	1-249-405-11	CARBON	100	5%	1/4W	
R915	1-215-393-00	METAL	68	1%	1/4W	
R916	1-249-389-11	CARBON	4.7	5%	1/4W	

<VARIABLE RESISTOR>

RV101	1-230-520-11	RES, ADJ, METAL GLAZE	1K			
RV102	1-230-519-11	RES, ADJ, METAL GLAZE	470			
RV301	1-230-522-11	RES, ADJ, METAL GLAZE	4.7K			
RV501	1-230-522-11	RES, ADJ, METAL GLAZE	4.7K			
RV502	1-230-519-11	RES, ADJ, METAL GLAZE	470			
RV503	1-230-523-11	RES, ADJ, METAL GLAZE	10K			
RV504	1-230-531-11	RES, ADJ, METAL GLAZE	220			
RV505	1-230-519-11	RES, ADJ, METAL GLAZE	470			
RV506	1-230-528-11	RES, ADJ, METAL GLAZE	220K			
RV507	1-230-520-11	RES, ADJ, METAL GLAZE	1K			
RV508	1-230-520-11	RES, ADJ, METAL GLAZE	1K			
RV701	1-230-520-11	RES, ADJ, METAL GLAZE	1K			
RV702	1-230-520-11	RES, ADJ, METAL GLAZE	1K			
RV703	1-230-520-11	RES, ADJ, METAL GLAZE	1K			
RV704	1-230-531-11	RES, ADJ, METAL GLAZE	220			
RV705	1-230-521-11	RES, ADJ, METAL GLAZE	2.2K			
RV706	1-230-521-11	RES, ADJ, METAL GLAZE	2.2K			
RV707	1-230-521-11	RES, ADJ, METAL GLAZE	2.2K			

Ref.No	Part No.	Description			Remark
		<RELAY>			
RY901	1-515-622-11	RELAY			
RY902	1-515-622-11	RELAY			
RY903	1-515-622-11	RELAY			
RY904	1-515-622-11	RELAY			
RY905	1-515-622-11	RELAY			
RY906	1-515-622-11	RELAY			
RY907	1-515-622-11	RELAY			
RY908	1-515-622-11	RELAY			
		<TRANSFORMER>			
T501	1-425-928-00	TRANSFORMER, DELAY ADJUSTING			
		<CRYSTAL>			
X501	1-567-504-11	OSCILLATOR, CRYSTAL			
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	*A-7160-098-A	FM-30 BOARD, COMPLETE *********************			
	*3-170-106-01	SHEET, X'TAL SHIELD			
	*3-176-365-01	COVER, FMP SHIELD REAR			
	*3-176-366-01	SHEET, INSULATING, FMP REAR			
	*3-701-748-00	CLAMP			
	*3-744-528-02	BRACKET, PB			
	*4-386-173-01	SPACER			
	7-685-645-79	SCREW +BVTP 3 × 6 TYPE2			
		<BAND PASS, FILTER>			
BF401	1-235-439-11	FILTER, BAND PASS (4.43MHz)			
BF402	1-235-439-11	FILTER, BAND PASS (4.43MHz)			
BF403	1-235-439-11	FILTER, BAND PASS (4.43MHz)			
		<CAPASITOR>			
C101	1-161-051-00	CERAMIC	0.01MF	10%	25V
C102	1-124-589-11	ELECT	47MF	20%	10V
C103	1-161-021-11	CERAMIC	0.047MF	10%	25V
C104	1-126-157-11	ELECT	10MF	20%	16V
C105	1-161-021-11	CERAMIC	0.047MF	10%	25V
C106	1-126-157-11	ELECT	10MF	20%	16V
C107	1-161-051-00	CERAMIC	0.01MF	10%	25V
C108	1-126-157-11	ELECT	10MF	20%	16V
C110	1-102-965-00	CERAMIC	39PF	5%	50V
C111	1-126-157-11	ELECT	10MF	20%	16V
C112	1-124-589-11	ELECT	47MF	20%	10V
C123	1-161-051-00	CERAMIC	0.01MF	10%	25V
C124	1-126-154-11	ELECT	47MF	20%	6.3V
C125	1-161-772-11	CERAMIC	0.1MF	10%	25V
C126	1-126-154-11	ELECT	47MF	20%	6.3V
C127	1-161-051-00	CERAMIC	0.01MF	10%	25V
C128	1-161-772-11	CERAMIC	0.1MF	10%	25V
C129	1-161-051-00	CERAMIC	0.01MF	10%	25V
C130	1-126-154-11	ELECT	47MF	20%	6.3V
C131	1-161-772-11	CERAMIC	0.1MF	10%	25V
C132	1-126-154-11	ELECT	47MF	20%	6.3V
C133	1-161-051-00	CERAMIC	0.01MF	10%	25V
C134	1-161-772-11	CERAMIC	0.1MF	10%	25V
C135	1-161-051-00	CERAMIC	0.01MF	10%	25V
C136	1-126-154-11	ELECT	47MF	20%	6.3V
C137	1-161-772-11	CERAMIC	0.1MF	10%	25V
C138	1-126-154-11	ELECT	47MF	20%	6.3V
C139	1-161-051-00	CERAMIC	0.01MF	10%	25V
C140	1-161-772-11	CERAMIC	0.1MF	10%	25V
C141	1-102-074-00	CERAMIC	0.001MF	10%	50V
C142	1-124-589-11	ELECT	47MF	20%	16V
C201	1-124-589-11	ELECT	47MF	20%	10V
C202	1-161-051-00	CERAMIC	0.01MF	10%	25V
C203	1-124-589-11	ELECT	47MF	20%	10V
C204	1-161-051-00	CERAMIC	0.01MF	10%	25V
C206	1-161-051-00	CERAMIC	0.01MF	10%	25V
C208	1-161-051-00	CERAMIC	0.01MF	10%	25V
C209	1-124-589-11	ELECT	47MF	20%	10V
C210	1-161-051-00	CERAMIC	0.01MF	10%	25V
C211	1-161-051-00	CERAMIC	0.01MF	10%	25V
C212	1-124-589-11	ELECT	47MF	20%	10V
C213	1-164-159-11	CERAMIC	0.1MF		50V
C214	1-164-159-11	CERAMIC	0.1MF		50V
C215	1-126-157-11	ELECT	10MF	20%	16V
C216	1-126-157-11	ELECT	10MF	20%	16V
C217	1-164-159-11	CERAMIC	0.1MF		50V
C218	1-164-159-11	CERAMIC	0.1MF		50V
C219	1-161-051-00	CERAMIC	0.01MF	10%	25V
C220	1-124-589-11	ELECT	47MF	20%	10V
C221	1-164-159-11	CERAMIC	0.1MF		50V
C222	1-164-159-11	CERAMIC	0.1MF		50V
C223	1-164-159-11	CERAMIC	0.1MF		50V
C224	1-164-159-11	CERAMIC	0.1MF		50V
C225	1-124-589-11	ELECT	47MF	20%	10V
C226	1-161-051-00	CERAMIC	0.01MF	10%	25V
C227	1-164-159-11	CERAMIC	0.1MF		50V
C228	1-126-301-11	ELECT	1MF	20%	50V
C229	1-126-301-11	ELECT	1MF	20%	50V
C230	1-161-051-00	CERAMIC	0.01MF	10%	25V
C231	1-161-051-00	CERAMIC	0.01MF	10%	25V
C232	1-102-820-00	CERAMIC	330PF	5%	50V
C233	1-102-973-00	CERAMIC	100PF	5%	50V
C234	1-162-806-11	CERAMIC	0.1MF	10%	50V
C235	1-162-806-11	CERAMIC	0.1MF	10%	50V
C236	1-124-589-11	ELECT	47MF	20%	10V
C237	1-161-047-00	CERAMIC	0.0047MF	10%	25V
C238	1-102-973-00	CERAMIC	100PF	5%	50V
C239	1-102-947-00	CERAMIC	10PF	0.5PF	50V
C241	1-164-159-11	CERAMIC	0.1MF		50V
C242	1-102-074-00	CERAMIC	0.001MF	10%	50V
C243	1-124-589-11	ELECT	47MF	20%	10V
C244	1-161-051-00	CERAMIC	0.01MF	10%	25V
C245	1-164-159-11	CERAMIC	0.1MF		50V
C246	1-126-301-11	ELECT	1MF	20%	50V
C247	1-126-301-11	ELECT	1MF	20%	50V
C248	1-161-051-00	CERAMIC	0.01MF	10%	25V
C249	1-161-051-00	CERAMIC	0.01MF	10%	25V
C250	1-162-806-11	CERAMIC	0.1MF	10%	50V
C251	1-162-806-11	CERAMIC	0.1MF	10%	50V
C252	1-126-301-11	ELECT	1MF	20%	50V
C253	1-161-057-00	CERAMIC	0.033MF	10%	25V
C254	1-102-973-00	CERAMIC	100PF	5%	50V
C255	1-102-947-00	CERAMIC	10PF	0.5PF	50V
C257	1-164-159-11	CERAMIC	0.1MF		50V

Ref.No	Part No.	Description			Remark
C258	1-102-074-00	CERAMIC	0.001MF	10%	50V
C259	1-161-051-00	CERAMIC	0.01MF	10%	25V
C260	1-124-589-11	ELECT	47MF	20%	10V
C261	1-164-159-11	CERAMIC	0.1M		50V
C262	1-164-159-11	CERAMIC	0.1MF		50V
C264	1-161-051-00	CERAMIC	0.01MF	10%	25V
C265	1-124-589-11	ELECT	47MF	20%	10V
C266	1-161-051-00	CERAMIC	0.01MF	10%	25V
C267	1-124-589-11	ELECT	47MF	20%	10V
C268	1-161-051-00	CERAMIC	0.01MF	10%	25V
C269	1-161-051-00	CERAMIC	0.01MF	10%	25V
C270	1-161-051-00	CERAMIC	0.01MF	10%	25V
C271	1-161-051-00	CERAMIC	0.01MF	10%	25V
C272	1-126-301-11	ELECT	1MF	20%	50V
C273	1-161-051-00	CERAMIC	0.01MF	10%	25V
C274	1-101-361-00	CERAMIC	150PF	5%	50V
C276	1-124-257-00	ELECT	2.2MF	20%	50V
C277	1-161-051-00	CERAMIC	0.01MF	10%	25V
C278	1-164-159-11	CERAMIC	0.1MF		50V
C279	1-164-159-11	CERAMIC	0.1MF		50V
C280	1-164-159-11	CERAMIC	0.1MF		50V
C281	1-164-159-11	CERAMIC	0.1MF		50V
C282	1-164-159-11	CERAMIC	0.1MF		50V
C283	1-164-159-11	CERAMIC	0.1MF		50V
C284	1-161-051-00	CERAMIC	0.01MF	10%	25V
C285	1-161-051-00	CERAMIC	0.01MF	10%	25V
C286	1-162-806-11	CERAMIC	0.1MF	10%	50V
C287	1-102-959-00	CERAMIC	22PF	5%	50V
C288	1-162-806-11	CERAMIC	0.1MF	10%	50V
C289	1-163-141-00	CERAMIC CHIP	0.001MF	5%	50V
C290	1-163-141-00	CERAMIC CHIP	0.001MF	5%	50V
C292	1-102-959-00	CERAMIC	22PF	5%	50V
C293	1-161-057-00	CERAMIC	0.033MF	10%	25V
C294	1-161-051-00	CERAMIC	0.01MF	10%	25V
C295	1-124-464-11	ELECT	0.22MF	20%	50V
C296	1-161-051-00	CERAMIC	0.01MF	10%	25V
C297	1-161-051-00	CERAMIC	0.01MF	10%	25V
C298	1-161-051-00	CERAMIC	0.01MF	10%	25V
C301	1-124-589-11	ELECT	47MF	20%	10V
C302	1-161-051-00	CERAMIC	0.01MF	10%	25V
C303	1-124-589-11	ELECT	47MF	20%	10V
C304	1-161-051-00	CERAMIC	0.01MF	10%	25V
C305	1-102-951-00	CERAMIC	15PF	5%	50V
C306	1-101-880-00	CERAMIC	47PF	5%	50V
C307	1-102-951-00	CERAMIC	15PF	5%	50V
C308	1-126-301-11	ELECT	1MF	20%	50V
C309	1-126-301-11	ELECT	1MF	20%	50V
C310	1-124-589-11	ELECT	47MF	20%	10V
C311	1-161-051-00	CERAMIC	0.01MF	10%	25V
C312	1-102-951-00	CERAMIC	15PF	5%	50V
C313	1-101-880-00	CERAMIC	47PF	5%	50V
C314	1-102-951-00	CERAMIC	15PF	5%	50V
C315	1-126-301-11	ELECT	1MF	20%	50V
C316	1-126-301-11	ELECT	1MF	20%	50V
C317	1-124-589-11	ELECT	47MF	20%	10V
C318	1-161-051-00	CERAMIC	0.01MF	10%	25V
C319	1-102-951-00	CERAMIC	15PF	5%	50V
C320	1-101-880-00	CERAMIC	47PF	5%	50V
C321	1-102-951-00	CERAMIC	15PF	5%	50V
C322	1-126-157-11	ELECT	10MF	20%	16V
C323	1-126-301-11	ELECT	1MF	20%	50V
C340	1-102-953-00	CERAMIC	18PF	5%	50V
C375	1-161-051-00	CERAMIC	0.01MF	10%	25V
C376	1-126-157-11	ELECT	10MF	20%	16V
C402	1-161-021-11	CERAMIC	0.047MF	10%	25V
C403	1-124-472-11	ELECT	470MF	20%	10V
C404	1-124-443-00	ELECT	100MF	20%	10V
C405	1-124-443-00	ELECT	100MF	20%	10V
C406	1-126-176-11	ELECT	220MF	20%	10V
C407	1-161-021-11	CERAMIC	0.047MF	10%	25V
C408	1-126-157-11	ELECT	10MF	20%	16V
C409	1-124-443-00	ELECT	100MF	20%	10V
C410	1-102-973-00	CERAMIC	100PF	5%	50V
C411	1-126-157-11	ELECT	10MF	20%	16V
C412	1-124-472-11	ELECT	470MF	20%	10V
C413	1-124-443-00	ELECT	100MF	20%	10V
C414	1-102-965-00	CERAMIC	39PF	5%	50V
C415	1-161-021-11	CERAMIC	0.047MF	10%	25V
C416	1-126-157-11	ELECT	10MF	20%	16V
C417	1-126-157-11	ELECT	10MF	20%	16V
C418	1-124-472-11	ELECT	470MF	20%	10V
C419	1-124-443-00	ELECT	100MF	20%	10V
C420	1-102-965-00	CERAMIC	39PF	5%	50V
C421	1-161-021-11	CERAMIC	0.047MF	10%	25V
C422	1-126-157-11	ELECT	10MF	20%	16V
C423	1-126-157-11	ELECT	10MF	20%	16V
C424	1-124-472-11	ELECT	470MF	20%	10V
C425	1-126-157-11	ELECT	10MF	20%	16V
C426	1-161-021-11	CERAMIC	0.047MF	10%	25V
C430	1-102-961-00	CERAMIC	27PF	5%	50V
C431	1-101-361-00	CERAMIC	150PF	5%	50V
C432	1-124-443-00	ELECT	100MF	20%	10V
C433	1-126-301-11	ELECT	1MF	20%	50V
C436	1-126-301-11	ELECT	1MF	20%	50V
C438	1-124-589-11	ELECT	47MF	20%	10V
C439	1-102-958-00	CERAMIC	20PF	5%	50V
C440	1-101-361-00	CERAMIC	150PF	5%	50V
C441	1-161-021-11	CERAMIC	0.047MF	10%	25V
C442	1-126-176-11	ELECT	220MF	20%	10V
C443	1-102-525-11	CERAMIC	68PF	5%	50V
C444	1-126-157-11	ELECT	10MF	20%	16V
C445	1-124-473-11	ELECT	1000MF	20%	10V
C446	1-161-021-11	CERAMIC	0.047MF	10%	25V
C447	1-124-443-00	ELECT	100MF	20%	10V
C448	1-102-820-00	CERAMIC	330PF	5%	50V
C449	1-124-472-11	ELECT	470MF	20%	10V
C450	1-124-472-11	ELECT	470MF	20%	10V
C473	1-161-055-00	CERAMIC	0.022MF	10%	25V
C474	1-124-473-11	ELECT	1000MF	20%	10V
C475	1-124-443-00	ELECT	100MF	20%	10V
C476	1-102-525-11	CERAMIC	68PF	5%	50V
C478	1-161-021-11	CERAMIC	0.047MF	10%	25V
C479	1-124-443-00	ELECT	100MF	20%	10V
C480	1-126-301-11	ELECT	1MF	20%	50V
C481	1-124-473-11	ELECT	1000MF	20%	10V
C482	1-161-021-11	CERAMIC	0.047MF	10%	25V
C483	1-126-157-11	ELECT	10MF	20%	16V
C484	1-126-157-11	ELECT	10MF	20%	16V
C485	1-126-301-11	ELECT	1MF	20%	50V
C487	1-126-301-11	ELECT	1MF	20%	50V

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Ref.No	Part No.	Description			Remark
C500	1-161-051-00	CERAMIC	0.01MF	10%	25V
C501	1-102-959-00	CERAMIC	22PF	5%	50V
C502	1-161-051-00	CERAMIC	0.01MF	10%	25V
C503	1-161-051-00	CERAMIC	0.01MF	10%	25V
C505	1-102-959-00	CERAMIC	22PF	5%	50V
C506	1-161-051-00	CERAMIC	0.01MF	10%	25V
C507	1-161-051-00	CERAMIC	0.01MF	10%	25V
C508	1-124-589-11	ELECT	47MF	20%	16V
C509	1-161-051-00	CERAMIC	0.01MF	10%	25V
C510	1-102-959-00	CERAMIC	22PF	5%	50V
C511	1-161-051-00	CERAMIC	0.01MF	10%	25V
C512	1-161-051-00	CERAMIC	0.01MF	10%	25V
C514	1-102-959-00	CERAMIC	220PF	5%	50V
C515	1-161-051-00	CERAMIC	0.01MF	10%	25V
C517	1-126-163-11	ELECT	4.7MF	20%	25V
C518	1-126-157-11	ELECT	10MF	20%	16V
C519	1-126-157-11	ELECT	10MF	20%	16V
C521	1-124-286-00	ELECT	33MF	20%	10V
C522	1-126-163-11	ELECT	4.7MF	20%	25V
C523	1-124-286-00	ELECT	33MF	20%	10V
C524	1-161-051-00	CERAMIC	0.01MF	10%	25V
C526	1-126-157-11	ELECT	10MF	20%	16V
C527	1-161-051-00	CERAMIC	0.01MF	10%	25V
C529	1-161-051-00	CERAMIC	0.01MF	10%	25V
C530	1-161-051-00	CERAMIC	0.01MF	10%	25V
C531	1-126-157-11	ELECT	10MF	20%	16V
C532	1-161-051-00	CERAMIC	0.01MF	10%	25V
C533	1-124-589-11	ELECT	47MF	20%	16V
C534	1-161-051-00	CERAMIC	0.01MF	10%	25V
C535	1-124-589-11	ELECT	47MF	20%	16V
C536	1-161-051-00	CERAMIC	0.01MF	10%	25V
C537	1-124-472-11	ELECT	470MF	20%	10V
C538	1-124-472-11	ELECT	470MF	20%	10V
C539	1-124-472-11	ELECT	470MF	20%	10V
C701	1-164-222-11	CERAMIC CHIP	0.22MF		25V
C702	1-164-222-11	CERAMIC CHIP	0.22MF		25V
C703	1-164-222-11	CERAMIC CHIP	0.22MF		25V
C704	1-164-222-11	CERAMIC CHIP	0.22MF		25V
C708	1-164-222-11	CERAMIC CHIP	0.22MF		25V
C709	1-164-222-11	CERAMIC CHIP	0.22MF		25V
C710	1-163-117-00	CERAMIC CHIP	100PF	5%	50V
C711	1-163-117-00	CERAMIC CHIP	100PF	5%	50V
C712	1-163-117-00	CERAMIC CHIP	100PF	5%	50V
C713	1-163-117-00	CERAMIC CHIP	100PF	5%	50V
C714	1-163-117-00	CERAMIC CHIP	100PF	5%	50V
C715	1-163-117-00	CERAMIC CHIP	100PF	5%	50V
C716	1-163-117-00	CERAMIC CHIP	100PF	5%	50V
C717	1-164-222-11	CERAMIC CHIP	0.22MF		25V
C718	1-164-222-11	CERAMIC CHIP	0.22MF		25V
C719	1-164-222-11	CERAMIC CHIP	0.22MF		25V
C720	1-164-222-11	CERAMIC CHIP	0.22MF		25V
C721	1-164-222-11	CERAMIC CHIP	0.22MF		25V
C722	1-164-222-11	CERAMIC CHIP	0.22MF		25V
C723	1-163-117-00	CERAMIC CHIP	100PF	5%	50V
C724	1-163-141-00	CERAMIC CHIP	0.001MF	5%	50V
C725	1-163-141-00	CERAMIC CHIP	0.001MF	5%	50V
C726	1-164-222-11	CERAMIC CHIP	0.22MF		25V
C727	1-164-222-11	CERAMIC CHIP	0.22MF		25V
C728	1-164-222-11	CERAMIC CHIP	0.22MF		25V
C901	1-161-051-00	CERAMIC	0.01MF	10%	25V
C902	1-124-589-11	ELECT	47MF	20%	10V
C903	1-124-589-11	ELECT	47MF	20%	10V
C904	1-161-051-00	CERAMIC	0.01MF	10%	25V
C905	1-161-051-00	CERAMIC	0.01MF	10%	25V
C906	1-124-589-11	ELECT	47MF	20%	10V
C907	1-102-965-00	CERAMIC	39PF	5%	50V
C908	1-124-916-11	ELECT	22MF	20%	35V
C909	1-161-055-00	CERAMIC	0.022MF	10%	25V
C910	1-161-055-00	CERAMIC	0.022MF	10%	25V
C911	1-102-965-00	CERAMIC	39PF	5%	50V
C912	1-102-976-00	CERAMIC	180PF	5%	50V
C913	1-161-055-00	CERAMIC	0.022MF	10%	25V
C914	1-161-055-00	CERAMIC	0.022MF	10%	25V
C915	1-126-157-11	ELECT	10MF	20%	16V
C916	1-161-057-00	CERAMIC	0.033MF	10%	25V
C917	1-161-055-00	CERAMIC	0.022MF	10%	25V
C918	1-161-051-00	CERAMIC	0.01MF	10%	25V
C919	1-124-589-11	ELECT	47MF	20%	10V
C920	1-126-301-11	ELECT	1MF	20%	50V
C921	1-161-051-00	CERAMIC	0.01MF	10%	25V
C922	1-161-051-00	CERAMIC	0.01MF	10%	25V
C923	1-124-967-11	ELECT	10MF	20%	10V
C924	1-124-589-11	ELECT	47MF	20%	10V
C925	1-161-051-00	CERAMIC	0.01MF	10%	25V
C926	1-161-051-00	CERAMIC	0.01MF	10%	25V
C927	1-161-051-00	CERAMIC	0.01MF	10%	25V
C928	1-124-589-11	ELECT	47MF	20%	10V
C929	1-124-464-11	ELECT	0.22MF	20%	50V
C930	1-126-157-11	ELECT	10MF	20%	16V
C931	1-161-051-00	CERAMIC	0.01MF	10%	25V
C932	1-124-589-11	ELECT	47MF	20%	10V
C933	1-161-051-00	CERAMIC	0.01MF	10%	25V
C934	1-161-051-00	CERAMIC	0.01MF	10%	25V
C935	1-161-051-00	CERAMIC	0.01MF	10%	25V
C936	1-124-589-11	ELECT	47MF	20%	10V
C937	1-124-589-11	ELECT	47MF	20%	10V
C938	1-161-051-00	CERAMIC	0.01MF	10%	25V
C939	1-126-157-11	ELECT	10MF	20%	16V
C940	1-161-051-00	CERAMIC	0.01MF	10%	25V
C941	1-124-589-11	ELECT	47MF	20%	10V
C943	1-161-051-00	CERAMIC	0.01MF	10%	25V
C944	1-162-806-11	CERAMIC	0.1MF	10%	50V
C945	1-161-051-00	CERAMIC	0.01MF	10%	25V
C946	1-124-589-11	ELECT	47MF	20%	10V
C947	1-126-157-11	ELECT	10MF	20%	16V
C948	1-102-959-00	CERAMIC	22PF	5%	50V
C949	1-161-051-00	CERAMIC	0.01MF	10%	25V
C950	1-124-589-11	ELECT	47MF	20%	10V
C951	1-101-880-00	CERAMIC	47PF	5%	50V
C952	1-161-051-00	CERAMIC	0.01MF	10%	25V
C953	1-162-806-11	CERAMIC	0.1MF	10%	50V
C954	1-126-157-11	ELECT	10MF	20%	16V
C955	1-102-959-00	CERAMIC	22PF	5%	50V
C956	1-161-051-00	CERAMIC	0.01MF	10%	25V
C957	1-161-051-00	CERAMIC	0.01MF	10%	25V
C958	1-124-589-11	ELECT	47MF	20%	10V
C959	1-161-051-00	CERAMIC	0.01MF	10%	25V
C960	1-102-973-00	CERAMIC	100PF	5%	50V
C961	1-126-157-11	ELECT	10MF	20%	16V
C962	1-101-880-00	CERAMIC	47PF	5%	50V

Ref.No	Part No.	Description	Remark
C971	1-101-880-00	CERAMIC 47PF 5%	50V
C980	1-163-117-00	CERAMIC CHIP 100PF 5%	50V
C981	1-163-117-00	CERAMIC CHIP 100PF 5%	50V
C982	1-163-117-00	CERAMIC CHIP 100PF 5%	50V
C983	1-163-117-00	CERAMIC CHIP 100PF 5%	50V
C984	1-163-141-00	CERAMIC CHIP 0.001MF 5%	50V
C985	1-163-141-00	CERAMIC CHIP 0.001MF 5%	50V
C986	1-163-141-00	CERAMIC CHIP 0.001MF 5%	50V
C987	1-163-141-00	CERAMIC CHIP 0.001MF 5%	50V
C988	1-163-141-00	CERAMIC CHIP 0.001MF 5%	50V
C989	1-163-141-00	CERAMIC CHIP 0.001MF 5%	50V
C997	1-161-051-00	CERAMIC 0.01MF 10%	25V
C998	1-124-589-11	ELECT 47MF 20%	10V
		<CONNECTOR>	
CN101	1-506-472-11	PIN, CONNECTOR 7P	
CN102	1-506-472-11	PIN, CONNECTOR 7P	
CN301	1-506-482-11	PIN, CONNECTOR 3P	
CN401	1-506-473-11	PIN, CONNECTOR 8P	
CN402	1-506-471-11	PIN, CONNECTOR 6P	
CN403	1-506-468-11	PIN, CONNECTOR 3P	
CN901	1-506-484-11	PIN, CONNECTOR 5P	
CN902	1-506-468-11	PIN, CONNECTOR 3P	
CN903	1-506-477-11	PIN, CONNECTOR 12P	
CN904	1-506-467-11	PIN, CONNECTOR 2P	
		<CERAMIC, TRIMMER>	
CV201	1-141-260-00	TRIMMER, CERAMIC	
CV202	1-141-260-00	TRIMMER, CERAMIC	
		<DIODE>	
D101	8-719-911-19	DIODE 1SS119	
D102	8-719-911-19	DIODE 1SS119	
D103	8-719-911-19	DIODE 1SS119	
D201	8-719-949-33	DIODE FC53M-4	
D202	8-719-949-33	DIODE FC53M-4	
D901	8-719-911-19	DIODE 1SS119	
D902	8-719-109-72	DIODE RD3.9ES-B2	
D903	8-719-911-19	DIODE 1SS119	
D904	8-719-911-19	DIODE 1SS119	
D905	8-719-911-19	DIODE 1SS119	
D906	8-719-911-19	DIODE 1SS119	
D907	8-719-911-19	DIODE 1SS119	
D908	8-719-911-19	DIODE 1SS119	
D909	8-719-911-19	DIODE 1SS119	
D911	8-719-108-12	DIODE RD9.1EW	
D922	8-719-109-85	DIODE RD5.1ES-B2	
D923	8-719-016-42	DIODE MC932	
		<DELAY LINE>	
DL401	1-415-348-21	DELAY LINE	
		<FERRITE, BEAD>	
FB101	1-543-255-11	BEAD, FERRITE	
FB102	1-543-255-11	BEAD, FERRITE	
FB103	1-543-255-11	BEAD, FERRITE	

Ref.No	Part No.	Description	Remark
		<FILTER>	
FL101	1-421-905-11	FILTER, NOISE	
FL201	1-421-905-11	FILTER, NOISE	
FL202	1-421-905-11	FILTER, NOISE	
FL203	1-421-905-11	FILTER, NOISE	
FL204	1-421-905-11	FILTER, NOISE	
FL205	1-421-905-11	FILTER, NOISE	
FL206	1-421-905-11	FILTER, NOISE	
FL301	1-421-905-11	FILTER, NOISE	
FL302	1-421-905-11	FILTER, NOISE	
FL901	1-421-905-11	FILTER, NOISE	
FL902	1-421-905-11	FILTER, NOISE	
		<IC>	
IC101	8-752-334-55	IC CXD1175AM	
IC102	8-752-334-55	IC CXD1175AM	
IC103	8-752-334-55	IC CXD1175AM	
IC201	8-759-232-94	IC TC74HC245AF	
IC202	8-759-232-94	IC TC74HC245AF	
IC203	8-759-925-90	IC SN74HC74ANS	
IC204	8-759-239-23	IC TC74HC86AF	
IC205	8-759-925-74	IC SN74HC04ANS	
IC206	8-759-987-17	IC CXD1226Q	
IC207	8-759-089-60	IC MB87448A-003	
IC208	8-759-072-23	IC MB87647	
IC209	8-759-072-23	IC MB87647	
IC210	8-759-987-18	IC CXD1227Q	
IC211	8-759-239-55	IC TC74HC123AF	
IC212	8-759-925-90	IC SN74HC74ANS	
IC213	8-759-925-76	IC SN74HC08ANS	
IC214	8-759-925-85	IC SN74HC32ANS	
IC215	8-759-925-74	IC SN74HC04ANS	
IC217	8-759-925-74	IC SN74HC04ANS	
IC218	8-752-340-75	IC CXK1206AM	
IC219	8-752-340-75	IC CXK1206AM	
IC220	8-752-340-75	IC CXK1206AM	
IC221	8-752-340-75	IC CXK1206AM	
IC222	8-752-340-75	IC CXK1206AM	
IC223	8-752-340-75	IC CXK1206AM	
IC224	8-759-925-90	IC SN74HC74ANS	
IC225	8-759-925-90	IC SN74HC74ANS	
IC226	8-759-926-24	IC SN74HC164ANS	
IC227	8-759-925-90	IC SN74HC74ANS	
IC228	8-759-239-55	IC TC74HC123AF	
IC229	8-759-925-85	IC SN74HC32ANS	
IC230	8-759-032-01	IC MC74HC00AF	
IC231	8-759-708-05	IC NJM78L05A	
IC232	8-759-232-65	IC TC74HC157AF	
IC233	8-759-032-01	IC MC74HC00AF	
IC234	8-759-239-55	IC TC74HC123AF	
IC235	8-759-925-85	IC SN74HC32ANS	
IC236	8-759-925-74	IC SN74HC04ANS	
IC240	8-759-925-76	IC SN74HC08ANS	
IC241	8-759-925-90	IC SN74HC74ANS	
IC242	8-759-239-23	IC TC74HC86AF	
IC243	8-759-239-55	IC TC74HC123AF	
IC244	8-759-925-85	IC SN74HC32ANS	
IC301	8-759-500-10	IC MB40778PF	
IC302	8-759-500-10	IC MB40778PF	
IC303	8-759-500-10	IC MB40778PF	

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Ref.No	Part No.	Description	Remark
IC305	8-759-908-15	IC TL431CLP	
IC306	8-759-701-56	IC NJM78M05FA	
IC402	8-759-400-06	IC AN608P	
IC403	8-759-400-06	IC AN608P	
IC404	8-759-032-01	IC MC74HC00AF	
IC405	8-759-239-55	IC TC74HC123AF	
IC407	8-759-400-06	IC AN608P	
IC410	8-759-300-71	IC HD14053BFP	
IC411	8-759-906-59	IC CX22017	
IC412	8-759-700-65	IC NJM79L05A	
IC901	8-759-978-96	IC SN75207BNS	
IC902	8-759-908-17	IC TL082CPS	
IC903	8-759-105-49	IC UPC319G2	
IC904	8-752-335-47	IC CXD1216M	
IC905	8-759-300-71	IC HD14053BFP	
IC906	8-759-100-94	IC UPC358G2	
IC907	8-752-332-67	IC CXD1217M	
IC910	8-759-100-94	IC UPC358G2	
IC911	8-759-902-88	IC SN74LS123NS	
IC912	8-759-106-81	IC UPD74HC123AG	
IC930	8-759-925-74	IC SN74HC04ANS	
		<INDUCTOR>	
L101	1-408-409-00	INDUCTOR 10UH	
L103	1-408-409-00	INDUCTOR 10UH	
L104	1-408-421-00	INDUCTOR 100UH	
L201	1-408-409-00	INDUCTOR 10UH	
L202	1-408-409-00	INDUCTOR 10UH	
L203	1-408-409-00	INDUCTOR 10UH	
L204	1-408-409-00	INDUCTOR 10UH	
L205	1-408-409-00	INDUCTOR 10UH	
L206	1-408-409-00	INDUCTOR 10UH	
L207	1-410-415-11	INDUCTOR 4.7UH	
L208	1-410-415-11	INDUCTOR 4.7UH	
L209	1-408-409-00	INDUCTOR 10UH	
L210	1-408-409-00	INDUCTOR 10UH	
L211	1-408-409-00	INDUCTOR 10UH	
L212	1-408-409-00	INDUCTOR 10UH	
L213	1-408-409-00	INDUCTOR 10UH	
L214	1-408-409-00	INDUCTOR 10UH	
L215	1-408-409-00	INDUCTOR 10UH	
L301	1-408-409-00	INDUCTOR 10UH	
L302	1-408-409-00	INDUCTOR 10UH	
L303	1-408-416-00	INDUCTOR 39UH	
L304	1-408-416-00	INDUCTOR 39UH	
L305	1-408-416-00	INDUCTOR 39UH	
L306	1-408-416-00	INDUCTOR 39UH	
L307	1-408-416-00	INDUCTOR 39UH	
L308	1-408-416-00	INDUCTOR 39UH	
L402	1-408-409-00	INDUCTOR 10UH	
L403	1-408-409-00	INDUCTOR 10UH	
L404	1-408-409-00	INDUCTOR 10UH	
L405	1-408-419-00	INDUCTOR 68UH	
L410	1-408-409-00	INDUCTOR 10UH	
L411	1-408-409-00	INDUCTOR 10UH	
L901	1-408-409-00	INDUCTOR 10UH	
L902	1-408-409-00	INDUCTOR 10UH	
L903	1-408-409-00	INDUCTOR 10UH	
L904	1-408-415-00	INDUCTOR 33UH	
L905	1-408-421-00	INDUCTOR 100UH	
L906	1-408-409-00	INDUCTOR 10UH	

Ref.No	Part No.	Description	Remark
L907	1-408-409-00	INDUCTOR 10UH	
L908	1-408-409-00	INDUCTOR 10UH	
L909	1-408-409-00	INDUCTOR 10UH	
L910	1-408-409-00	INDUCTOR 10UH	
L911	1-408-409-00	INDUCTOR 10UH	
L913	1-408-409-00	INDUCTOR 10UH	
L914	1-408-409-00	INDUCTOR 10UH	
L915	1-408-409-00	INDUCTOR 10UH	
L921	1-408-409-00	INDUCTOR 10UH	
		<TRANSISTOR>	
Q101	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q102	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q103	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q104	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q105	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q106	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q107	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q108	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q109	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q110	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q301	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q302	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q303	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q401	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q402	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q403	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q404	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q405	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q406	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q407	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q408	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q409	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q410	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q411	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q412	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q413	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q414	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q415	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q416	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q417	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q418	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q419	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q421	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q422	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q423	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q424	8-729-201-05	TRANSISTOR 2SC2878B	
Q425	8-729-900-89	TRANSISTOR DTC144ES	
Q427	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q428	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q429	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q430	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q431	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q432	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q433	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q434	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q435	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q436	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q437	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q438	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q455	8-729-119-78	TRANSISTOR 2SC2785-HFE	

Ref.No	Part No.	Description			Remark
Q456	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q457	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q458	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q459	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q460	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q461	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q462	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q463	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q465	8-729-900-89	TRANSISTOR DTC144ES			
Q466	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q470	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q471	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q472	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q473	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q474	8-729-119-76	TRANSISTOR 2SA1175-HFE			
Q475	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q476	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q477	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q478	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q479	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q480	8-729-119-76	TRANSISTOR 2SA1175-HFE			
Q481	8-729-119-76	TRANSISTOR 2SA1175-HFE			
Q482	8-729-201-05	TRANSISTOR 2SC2878B			
Q483	8-729-201-05	TRANSISTOR 2SC2878B			
Q484	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q485	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q486	8-729-900-89	TRANSISTOR DTC144ES-HFE			
Q487	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q488	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q489	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q901	8-729-105-71	TRANSISTOR 2SK523-K2			
Q902	8-729-105-71	TRANSISTOR 2SK523-K2			
Q903	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q904	8-729-119-78	TRANSISTOR 2SC2785-HFE			
Q905	8-729-105-71	TRANSISTOR 2SK523-K2			
		<RESISTOR>			
R101	1-249-421-11	CARBON	2.2K	5%	1/4W
R102	1-249-430-11	CARBON	12K	5%	1/4W
R103	1-249-421-11	CARBON	2.2K	5%	1/4W
R104	1-249-405-11	CARBON	100	5%	1/4W
R105	1-249-421-11	CARBON	2.2K	5%	1/4W
R106	1-249-430-11	CARBON	12K	5%	1/4W
R107	1-249-421-11	CARBON	2.2K	5%	1/4W
R108	1-249-405-11	CARBON	100	5%	1/4W
R109	1-249-421-11	CARBON	2.2K	5%	1/4W
R110	1-249-427-11	CARBON	6.8K	5%	1/4W
R111	1-249-425-11	CARBON	4.7K	5%	1/4W
R112	1-249-429-11	CARBON	10K	5%	1/4W
R113	1-249-433-11	CARBON	22K	5%	1/4W
R114	1-249-421-11	CARBON	2.2K	5%	1/4W
R115	1-249-405-11	CARBON	100	5%	1/4W
R116	1-249-429-11	CARBON	10K	5%	1/4W
R117	1-249-421-11	CARBON	2.2K	5%	1/4W
R118	1-249-413-11	CARBON	470	5%	1/4W
R119	1-249-433-11	CARBON	22K	5%	1/4W
R120	1-249-433-11	CARBON	22K	5%	1/4W
R121	1-249-425-11	CARBON	4.7K	5%	1/4W
R122	1-249-425-11	CARBON	4.7K	5%	1/4W
R201	1-247-901-11	CARBON	820K	5%	1/4W
R202	1-247-893-11	CARBON	390K	5%	1/4W
R203	1-247-887-00	CARBON	220K	5%	1/4W
R204	1-249-441-11	CARBON	100K	5%	1/4W
R205	1-249-421-11	CARBON	2.2K	5%	1/4W
R206	1-249-402-11	CARBON	56	5%	1/4W
R207	1-249-417-11	CARBON	1K	5%	1/4W
R208	1-249-421-11	CARBON	2.2K	5%	1/4W
R209	1-249-403-11	CARBON	68	5%	1/4W
R210	1-249-417-11	CARBON	1K	5%	1/4W
R211	1-249-417-11	CARBON	1K	5%	1/4W
R212	1-249-421-11	CARBON	2.2K	5%	1/4W
R213	1-247-903-00	CARBON	1M	5%	1/4W
R214	1-249-441-11	CARBON	100K	5%	1/4W
R215	1-249-435-11	CARBON	33K	5%	1/4W
R216	1-249-435-11	CARBON	33K	5%	1/4W
R217	1-249-424-11	CARBON	3.9K	5%	1/4W
R218	1-249-420-11	CARBON	1.8K	5%	1/4W
R219	1-249-409-11	CARBON	220	5%	1/4W
R220	1-249-421-11	CARBON	2.2K	5%	1/4W
R221	1-249-402-11	CARBON	56	5%	1/4W
R222	1-249-417-11	CARBON	1K	5%	1/4W
R223	1-249-421-11	CARBON	2.2K	5%	1/4W
R224	1-249-403-11	CARBON	68	5%	1/4W
R225	1-249-417-11	CARBON	1K	5%	1/4W
R226	1-247-903-00	CARBON	1M	5%	1/4W
R227	1-249-435-11	CARBON	33K	5%	1/4W
R228	1-249-435-11	CARBON	33K	5%	1/4W
R229	1-249-435-11	CARBON	33K	5%	1/4W
R230	1-249-421-11	CARBON	2.2K	5%	1/4W
R231	1-249-413-11	CARBON	470	5%	1/4W
R233	1-249-417-11	CARBON	1K	5%	1/4W
R234	1-249-417-11	CARBON	1K	5%	1/4W
R235	1-249-413-11	CARBON	470	5%	1/4W
R236	1-249-417-11	CARBON	1K	5%	1/4W
R238	1-249-437-11	CARBON	47K	5%	1/4W
R239	1-249-441-11	CARBON	100K	5%	1/4W
R241	1-249-437-11	CARBON	47K	5%	1/4W
R242	1-249-437-11	CARBON	47K	5%	1/4W
R243	1-249-433-11	CARBON	22K	5%	1/4W
R244	1-249-441-11	CARBON	100K	5%	1/4W
R245	1-249-425-11	CARBON	4.7K	5%	1/4W
R246	1-249-413-11	CARBON	470	5%	1/4W
R248	1-249-413-11	CARBON	470	5%	1/4W
R249	1-249-441-11	CARBON	100K	5%	1/4W
R250	1-247-887-00	CARBON	220K	5%	1/4W
R251	1-249-409-11	CARBON	220	5%	1/4W
R252	1-247-887-00	CARBON	220K	5%	1/4W
R253	1-249-429-11	CARBON	10K	5%	1/4W
R254	1-249-399-11	CARBON	33	5%	1/4W
R255	1-216-049-00	METAL GLAZE	1K	5%	1/10W
R256	1-216-049-00	METAL GLAZE	1K	5%	1/10W
R257	1-216-049-00	METAL GLAZE	1K	5%	1/10W
R258	1-216-049-00	METAL GLAZE	1K	5%	1/10W
R259	1-216-049-00	METAL GLAZE	1K	5%	1/10W
R260	1-216-049-00	METAL GLAZE	1K	5%	1/10W
R261	1-216-049-00	METAL GLAZE	1K	5%	1/10W
R262	1-216-049-00	METAL GLAZE	1K	5%	1/10W
R263	1-216-049-00	METAL GLAZE	1K	5%	1/10W
R264	1-216-049-00	METAL GLAZE	1K	5%	1/10W
R265	1-216-049-00	METAL GLAZE	1K	5%	1/10W
R266	1-216-049-00	METAL GLAZE	1K	5%	1/10W
R267	1-216-049-00	METAL GLAZE	1K	5%	1/10W
R268	1-216-049-00	METAL GLAZE	1K	5%	1/10W

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Ref.No	Part No.	Description			Remark
R302	1-249-417-11	CARBON	1K	5%	1/4W
R303	1-249-417-11	CARBON	1K	5%	1/4W
R304	1-249-407-11	CARBON	150	5%	1/4W
R307	1-249-417-11	CARBON	1K	5%	1/4W
R308	1-249-417-11	CARBON	1K	5%	1/4W
R309	1-249-429-11	CARBON	10K	5%	1/4W
R310	1-249-435-11	CARBON	33K	5%	1/4W
R312	1-249-417-11	CARBON	1K	5%	1/4W
R313	1-249-417-11	CARBON	1K	5%	1/4W
R314	1-249-430-11	CARBON	12K	5%	1/4W
R317	1-249-413-11	CARBON	470	5%	1/4W
R318	1-249-413-11	CARBON	470	5%	1/4W
R319	1-249-413-11	CARBON	470	5%	1/4W
R320	1-249-413-11	CARBON	470	5%	1/4W
R321	1-249-413-11	CARBON	470	5%	1/4W
R322	1-249-413-11	CARBON	470	5%	1/4W
R400	1-249-421-11	CARBON	2.2K	5%	1/4W
R402	1-249-422-11	CARBON	2.7K	5%	1/4W
R403	1-249-422-11	CARBON	2.7K	5%	1/4W
R404	1-249-405-11	CARBON	100	5%	1/4W
R405	1-249-413-11	CARBON	470	5%	1/4W
R406	1-249-421-11	CARBON	2.2K	5%	1/4W
R407	1-249-420-11	CARBON	1.8K	5%	1/4W
R408	1-249-417-11	CARBON	1K	5%	1/4W
R409	1-249-409-11	CARBON	220	5%	1/4W
R410	1-249-413-11	CARBON	470	5%	1/4W
R411	1-249-421-11	CARBON	2.2K	5%	1/4W
R412	1-249-420-11	CARBON	1.8K	5%	1/4W
R413	1-249-417-11	CARBON	1K	5%	1/4W
R414	1-249-417-11	CARBON	1K	5%	1/4W
R415	1-249-414-11	CARBON	560	5%	1/4W
R416	1-249-413-11	CARBON	470	5%	1/4W
R417	1-249-435-11	CARBON	33K	5%	1/4W
R418	1-249-429-11	CARBON	10K	5%	1/4W
R419	1-249-413-11	CARBON	470	5%	1/4W
R420	1-249-401-11	CARBON	47	5%	1/4W
R422	1-249-419-11	CARBON	1.5K	5%	1/4W
R423	1-249-417-11	CARBON	1K	5%	1/4W
R424	1-249-435-11	CARBON	33K	5%	1/4W
R425	1-249-429-11	CARBON	10K	5%	1/4W
R426	1-249-424-11	CARBON	3.9K	5%	1/4W
R427	1-249-413-11	CARBON	470	5%	1/4W
R428	1-249-408-11	CARBON	180	5%	1/4W
R429	1-249-441-11	CARBON	100K	5%	1/4W
R432	1-249-435-11	CARBON	33K	5%	1/4W
R433	1-249-429-11	CARBON	10K	5%	1/4W
R435	1-249-408-11	CARBON	180	5%	1/4W
R436	1-249-409-11	CARBON	220	5%	1/4W
R437	1-249-419-11	CARBON	1.5K	5%	1/4W
R438	1-249-417-11	CARBON	1K	5%	1/4W
R439	1-249-435-11	CARBON	33K	5%	1/4W
R440	1-249-429-11	CARBON	10K	5%	1/4W
R441	1-249-424-11	CARBON	3.9K	5%	1/4W
R442	1-249-413-11	CARBON	470	5%	1/4W
R443	1-249-408-11	CARBON	180	5%	1/4W
R444	1-249-441-11	CARBON	100K	5%	1/4W
R447	1-249-435-11	CARBON	33K	5%	1/4W
R448	1-249-429-11	CARBON	10K	5%	1/4W
R449	1-249-409-11	CARBON	220	5%	1/4W
R450	1-249-408-11	CARBON	180	5%	1/4W
R452	1-249-419-11	CARBON	1.5K	5%	1/4W

Ref.No	Part No.	Description			Remark
R453	1-249-417-11	CARBON	1K	5%	1/4W
R454	1-249-435-11	CARBON	33K	5%	1/4W
R455	1-249-429-11	CARBON	10K	5%	1/4W
R456	1-249-424-11	CARBON	3.9K	5%	1/4W
R457	1-249-413-11	CARBON	470	5%	1/4W
R458	1-249-408-11	CARBON	180	5%	1/4W
R459	1-249-441-11	CARBON	100K	5%	1/4W
R462	1-247-804-11	CARBON	75	5%	1/4W
R463	1-247-804-11	CARBON	75	5%	1/4W
R464	1-247-804-11	CARBON	75	5%	1/4W
R465	1-249-413-11	CARBON	470	5%	1/4W
R466	1-249-417-11	CARBON	1K	5%	1/4W
R468	1-249-433-11	CARBON	22K	5%	1/4W
R469	1-249-425-11	CARBON	4.7K	5%	1/4W
R470	1-249-417-11	CARBON	1K	5%	1/4W
R471	1-249-413-11	CARBON	470	5%	1/4W
R472	1-249-429-11	CARBON	10K	5%	1/4W
R473	1-249-413-11	CARBON	470	5%	1/4W
R474	1-249-409-11	CARBON	220	5%	1/4W
R477	1-249-421-11	CARBON	2.2K	5%	1/4W
R478	1-249-425-11	CARBON	4.7K	5%	1/4W
R481	1-249-421-11	CARBON	2.2K	5%	1/4W
R482	1-249-417-11	CARBON	1K	5%	1/4W
R483	1-249-429-11	CARBON	10K	5%	1/4W
R484	1-249-429-11	CARBON	10K	5%	1/4W
R485	1-249-421-11	CARBON	2.2K	5%	1/4W
R486	1-249-417-11	CARBON	1K	5%	1/4W
R487	1-249-412-11	CARBON	390	5%	1/4W
R488	1-249-420-11	CARBON	1.8K	5%	1/4W
R489	1-249-409-11	CARBON	220	5%	1/4W
R490	1-249-418-11	CARBON	1.2K	5%	1/4W
R491	1-249-429-11	CARBON	10K	5%	1/4W
R492	1-249-425-11	CARBON	4.7K	5%	1/4W
R493	1-249-409-11	CARBON	220	5%	1/4W
R495	1-249-409-11	CARBON	220	5%	1/4W
R496	1-249-407-11	CARBON	150	5%	1/4W
R497	1-249-409-11	CARBON	220	5%	1/4W
R499	1-249-419-11	CARBON	1.5K	5%	1/4W
R500	1-249-412-11	CARBON	390	5%	1/4W
R501	1-249-429-11	CARBON	10K	5%	1/4W
R502	1-249-421-11	CARBON	2.2K	5%	1/4W
R503	1-249-401-11	CARBON	47	5%	1/4W
R504	1-249-405-11	CARBON	100	5%	1/4W
R505	1-249-427-11	CARBON	6.8K	5%	1/4W
R506	1-249-420-11	CARBON	1.8K	5%	1/4W
R507	1-249-441-11	CARBON	100K	5%	1/4W
R508	1-249-425-11	CARBON	4.7K	5%	1/4W
R509	1-249-429-11	CARBON	10K	5%	1/4W
R510	1-249-419-11	CARBON	1.5K	5%	1/4W
R511	1-249-405-11	CARBON	100	5%	1/4W
R512	1-249-412-11	CARBON	390	5%	1/4W
R513	1-247-804-11	CARBON	75	5%	1/4W
R514	1-249-441-11	CARBON	100K	5%	1/4W
R515	1-247-804-11	CARBON	75	5%	1/4W
R563	1-249-417-11	CARBON	1K	5%	1/4W
R564	1-249-429-11	CARBON	10K	5%	1/4W
R565	1-249-424-11	CARBON	3.9K	5%	1/4W
R566	1-249-413-11	CARBON	470	5%	1/4W
R567	1-249-405-11	CARBON	100	5%	1/4W
R568	1-249-409-11	CARBON	220	5%	1/4W
R569	1-249-432-11	CARBON	18K	5%	1/4W

Ref.No	Part No.	Description			Remark
R570	1-249-430-11	CARBON	12K	5%	1/4W
R571	1-249-441-11	CARBON	100K	5%	1/4W
R572	1-249-407-11	CARBON	150	5%	1/4W
R575	1-249-412-11	CARBON	390	5%	1/4W
R576	1-249-419-11	CARBON	1.5K	5%	1/4W
R577	1-249-429-11	CARBON	10K	5%	1/4W
R578	1-249-421-11	CARBON	2.2K	5%	1/4W
R579	1-249-401-11	CARBON	47	5%	1/4W
R580	1-249-405-11	CARBON	100	5%	1/4W
R581	1-249-427-11	CARBON	6.8K	5%	1/4W
R582	1-249-420-11	CARBON	1.8K	5%	1/4W
R583	1-249-441-11	CARBON	100K	5%	1/4W
R584	1-247-804-11	CARBON	75	5%	1/4W
R585	1-247-804-11	CARBON	75	5%	1/4W
R586	1-249-413-11	CARBON	470	5%	1/4W
R589	1-249-421-11	CARBON	2.2K	5%	1/4W
R590	1-249-421-11	CARBON	2.2K	5%	1/4W
R591	1-249-429-11	CARBON	10K	5%	1/4W
R592	1-249-424-11	CARBON	3.9K	5%	1/4W
R595	1-249-429-11	CARBON	10K	5%	1/4W
R596	1-249-429-11	CARBON	10K	5%	1/4W
R600	1-249-417-11	CARBON	1K	5%	1/4W
R601	1-249-433-11	CARBON	22K	5%	1/4W
R602	1-249-430-11	CARBON	12K	5%	1/4W
R603	1-249-422-11	CARBON	2.7K	5%	1/4W
R604	1-249-417-11	CARBON	1K	5%	1/4W
R605	1-249-417-11	CARBON	1K	5%	1/4W
R607	1-249-426-11	CARBON	5.6K	5%	1/4W
R608	1-249-423-11	CARBON	3.3K	5%	1/4W
R609	1-249-417-11	CARBON	1K	5%	1/4W
R610	1-249-417-11	CARBON	1K	5%	1/4W
R612	1-249-426-11	CARBON	5.6K	5%	1/4W
R613	1-249-417-11	CARBON	1K	5%	1/4W
R614	1-249-433-11	CARBON	22K	5%	1/4W
R615	1-249-430-11	CARBON	12K	5%	1/4W
R616	1-249-422-11	CARBON	2.7K	5%	1/4W
R617	1-249-417-11	CARBON	1K	5%	1/4W
R618	1-249-417-11	CARBON	1K	5%	1/4W
R619	1-249-421-11	CARBON	2.2K	5%	1/4W
R620	1-249-426-11	CARBON	5.6K	5%	1/4W
R621	1-249-426-11	CARBON	5.6K	5%	1/4W
R622	1-249-417-11	CARBON	1K	5%	1/4W
R623	1-249-417-11	CARBON	1K	5%	1/4W
R625	1-249-426-11	CARBON	5.6K	5%	1/4W
R627	1-249-426-11	CARBON	5.6K	5%	1/4W
R628	1-249-429-11	CARBON	10K	5%	1/4W
R629	1-249-425-11	CARBON	4.7K	5%	1/4W
R630	1-249-441-11	CARBON	100K	5%	1/4W
R631	1-249-425-11	CARBON	4.7K	5%	1/4W
R632	1-249-417-11	CARBON	1K	5%	1/4W
R633	1-249-435-11	CARBON	33K	5%	1/4W
R634	1-249-431-11	CARBON	15K	5%	1/4W
R635	1-249-425-11	CARBON	4.7K	5%	1/4W
R636	1-249-417-11	CARBON	1K	5%	1/4W
R637	1-249-435-11	CARBON	33K	5%	1/4W
R638	1-249-431-11	CARBON	15K	5%	1/4W
R639	1-249-419-11	CARBON	1.5K	5%	1/4W
R640	1-249-417-11	CARBON	1K	5%	1/4W
R641	1-249-435-11	CARBON	33K	5%	1/4W
R642	1-249-429-11	CARBON	10K	5%	1/4W
R643	1-249-424-11	CARBON	3.9K	5%	1/4W
R644	1-249-417-11	CARBON	1K	5%	1/4W
R645	1-249-417-11	CARBON	1K	5%	1/4W
R646	1-249-434-11	CARBON	27K	5%	1/4W
R647	1-249-423-11	CARBON	3.3K	5%	1/4W
R648	1-249-423-11	CARBON	3.3K	5%	1/4W
R649	1-249-421-11	CARBON	2.2K	5%	1/4W
R650	1-249-421-11	CARBON	2.2K	5%	1/4W
R651	1-249-414-11	CARBON	560	5%	1/4W
R652	1-249-414-11	CARBON	560	5%	1/4W
R653	1-249-426-11	CARBON	5.6K	5%	1/4W
R654	1-249-423-11	CARBON	3.3K	5%	1/4W
R902	1-249-405-11	CARBON	100	5%	1/4W
R903	1-249-401-11	CARBON	47	5%	1/4W
R904	1-249-401-11	CARBON	47	5%	1/4W
R905	1-249-420-11	CARBON	1.8K	5%	1/4W
R906	1-247-838-00	CARBON	2K	5%	1/4W
R907	1-249-420-11	CARBON	1.8K	5%	1/4W
R908	1-249-417-11	CARBON	1K	5%	1/4W
R909	1-247-903-00	CARBON	1M	5%	1/4W
R910	1-247-903-00	CARBON	1M	5%	1/4W
R911	1-249-405-11	CARBON	100	5%	1/4W
R912	1-247-838-00	CARBON	2K	5%	1/4W
R913	1-247-903-00	CARBON	1M	5%	1/4W
R914	1-249-417-11	CARBON	1K	5%	1/4W
R915	1-249-423-11	CARBON	3.3K	5%	1/4W
R916	1-249-407-11	CARBON	150	5%	1/4W
R917	1-249-417-11	CARBON	1K	5%	1/4W
R918	1-249-415-11	CARBON	680	5%	1/4W
R919	1-249-417-11	CARBON	1K	5%	1/4W
R920	1-249-417-11	CARBON	1K	5%	1/4W
R921	1-249-426-11	CARBON	5.6K	5%	1/4W
R922	1-249-423-11	CARBON	3.3K	5%	1/4W
R923	1-249-421-11	CARBON	2.2K	5%	1/4W
R924	1-249-427-11	CARBON	6.8K	5%	1/4W
R925	1-249-435-11	CARBON	33K	5%	1/4W
R926	1-249-429-11	CARBON	10K	5%	1/4W
R927	1-215-429-00	METAL	2.2K	1%	1/4W
R928	1-215-435-00	METAL	3.9K	1%	1/4W
R929	1-249-425-11	CARBON	4.7K	5%	1/4W
R930	1-249-417-11	CARBON	1K	5%	1/4W
R931	1-249-431-11	CARBON	15K	5%	1/4W
R932	1-249-425-11	CARBON	4.7K	5%	1/4W
R933	1-249-429-11	CARBON	10K	5%	1/4W
R934	1-249-425-11	CARBON	4.7K	5%	1/4W
R935	1-247-903-00	CARBON	1M	5%	1/4W
R936	1-247-903-00	CARBON	1M	5%	1/4W
R937	1-249-429-11	CARBON	10K	5%	1/4W
R938	1-247-866-11	CARBON	30K	5%	1/4W
R939	1-249-434-11	CARBON	27K	5%	1/4W
R940	1-249-429-11	CARBON	10K	5%	1/4W
R941	1-249-405-11	CARBON	100	5%	1/4W
R942	1-249-421-11	CARBON	2.2K	5%	1/4W
R943	1-249-417-11	CARBON	1K	5%	1/4W
R944	1-249-417-11	CARBON	1K	5%	1/4W
R945	1-249-427-11	CARBON	6.8K	5%	1/4W
R946	1-249-435-11	CARBON	33K	5%	1/4W
R947	1-249-428-11	CARBON	8.2K	5%	1/4W
R948	1-249-429-11	CARBON	10K	5%	1/4W
R949	1-249-405-11	CARBON	100	5%	1/4W
R950	1-249-417-11	CARBON	1K	5%	1/4W
R951	1-249-421-11	CARBON	2.2K	5%	1/4W

The components identified by shading and marked ⚠ are critical for safety.
Replace only with the part number specified.

Ref.No	Part No.	Description	Remark
R952	1-249-429-11	CARBON 10K 5%	1/4W
R953	1-249-425-11	CARBON 4.7K 5%	1/4W
R954	1-249-421-11	CARBON 2.2K 5%	1/4W
R955	1-249-429-11	CARBON 10K 5%	1/4W
R984	1-249-433-11	CARBON 22K 5%	1/4W
R985	1-249-408-11	CARBON 180 5%	1/4W
		<VARIABLE, RESISTOR>	
RV101	1-230-522-11	RES, ADJ, METAL GLAZE	4.7K
RV102	1-230-522-11	RES, ADJ, METAL GLAZE	4.7K
RV103	1-230-522-11	RES, ADJ, METAL GLAZE	4.7K
RV202	1-230-527-11	RES, ADJ, METAL GLAZE	100K
RV203	1-230-521-11	RES, ADJ, METAL GLAZE	2.2K
RV401	1-230-519-11	RES, ADJ, METAL GLAZE	470
RV402	1-230-519-11	RES, ADJ, METAL GLAZE	470
RV403	1-230-519-11	RES, ADJ, METAL GLAZE	470
RV404	1-230-521-11	RES, ADJ, METAL GLAZE	2.2K
RV405	1-230-519-11	RES, ADJ, METAL GLAZE	470
RV406	1-230-519-11	RES, ADJ, METAL GLAZE	470
RV407	1-230-519-11	RES, ADJ, METAL GLAZE	470
RV408	1-230-520-11	RES, ADJ, METAL GLAZE	1K
RV409	1-230-524-11	RES, ADJ, METAL GLAZE	22K
RV410	1-230-523-11	RES, ADJ, METAL GLAZE	10K
RV412	1-230-519-11	RES, ADJ, METAL GLAZE	470
RV416	1-230-519-11	RES, ADJ, METAL GLAZE	470
RV419	1-230-519-11	RES, ADJ, METAL GLAZE	470
RV420	1-230-519-11	RES, ADJ, METAL GLAZE	470
RV421	1-230-519-11	RES, ADJ, METAL GLAZE	470
RV423	1-230-520-11	RES, ADJ, METAL GLAZE	1K
RV430	1-230-519-11	RES, ADJ, METAL GLAZE	470
RV431	1-230-522-11	RES, ADJ, METAL GLAZE	4.7K
RV432	1-230-521-11	RES, ADJ, METAL GLAZE	2.2K
RV433	1-230-521-11	RES, ADJ, METAL GLAZE	2.2K
RV435	1-230-519-11	RES, ADJ, METAL GLAZE	470
RV436	1-230-524-11	RES, ADJ, METAL GLAZE	22K
RV438	1-230-520-11	RES, ADJ, METAL GLAZE	1K
RV440	1-230-523-11	RES, ADJ, METAL GLAZE	10K
RV441	1-230-523-11	RES, ADJ, METAL GLAZE	10K
RV442	1-230-523-11	RES, ADJ, METAL GLAZE	10K
RV443	1-230-521-11	RES, ADJ, METAL GLAZE	2.2K
RV444	1-230-520-11	RES, ADJ, METAL GLAZE	1K
RV901	1-230-521-11	RES, ADJ, METAL GLAZE	2.2K
		<CRYSTAL>	
X901	1-527-585-00	OSCILLATOR, CRYSTAL	
X902	1-527-729-00	OSCILLATOR, CRYSTAL	

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Part No.	Description
*A-7160-099-A	COMPLETE PCB, PS-271 *******************
*4-386-173-01	SPACER
*4-613-505-01	SHEET, RADIATION
*4-854-790-00	HEAT SINK
*4-863-132-00	HEAT SINK (SMALL)
7-682-548-04	SCREW +P 3 × 8
7-682-548-04	SCREW +P 3 × 8

Ref.No	Part No.	Description	Remark
		<CAPACITOR>	
C1	1-102-518-11	CERAMIC 33PF 5%	50V
C2	1-102-518-11	CERAMIC 33PF 5%	50V
C3	1-161-051-00	CERAMIC 0.01MF 10%	25V
C4	1-124-464-11	ELECT 0.22MF 20%	50V
C9	1-161-051-00	CERAMIC 0.01MF 10%	25V
C10	1-161-051-00	CERAMIC 0.01MF 10%	25V
C12	1-161-051-00	CERAMIC 0.01MF 10%	25V
C13	1-161-051-00	CERAMIC 0.01MF 10%	25V
C20	1-124-589-11	ELECT 47MF 20%	10V
C21	1-126-157-11	ELECT 10MF 20%	16V
C22	1-126-157-11	ELECT 10MF 20%	16V
C701 ⚠.	1-136-212-00	FILM 0.1MF 20%	250V
C702 ⚠.	1-136-212-00	FILM 0.1MF 20%	250V
C703 ⚠.	1-161-742-00	CERAMIC 0.0022MF 20%	400V
C704 ⚠.	1-161-742-00	CERAMIC 0.0022MF 20%	400V
C705	1-125-428-11	ELECT(BLOCK) 22000MF 20%	16V
C706	1-125-428-11	ELECT(BLOCK) 22000MF 20%	16V
C707	1-125-428-11	ELECT(BLOCK) 22000MF 20%	16V
C708	1-125-428-11	ELECT(BLOCK) 22000MF 20%	16V
C709	1-124-480-11	ELECT 470MF 20%	25V
C710	1-124-480-11	ELECT 470MF 20%	25V
C711	1-124-480-11	ELECT 470MF 20%	25V
C714	1-136-171-00	FILM 0.33MF 5%	50V
C715	1-124-589-11	ELECT 47MF 20%	16V
C716	1-161-772-11	CERAMIC 0.1MF 10%	25V
C717	1-124-589-11	ELECT 47MF 20%	16V
C718	1-161-772-11	CERAMIC 0.1MF 10%	25V
C719	1-124-589-11	ELECT 47MF 20%	16V
C720	1-161-772-11	CERAMIC 0.1MF 10%	25V
C721	1-124-589-11	ELECT 47MF 20%	16V
C722	1-161-772-11	CERAMIC 0.1MF 10%	25V
C723	1-124-589-11	ELECT 47MF 20%	16V
C724	1-161-772-11	CERAMIC 0.1MF 10%	25V
C725	1-124-443-00	ELECT 100MF 20%	10V
C726	1-124-589-11	ELECT 47MF 20%	16V
C727 ⚠.	1-161-742-00	CERAMIC 0.0022MF 20%	400V
C728	1-161-063-00	CERAMIC 0.1MF 10%	50V
C729	1-161-063-00	CERAMIC 0.1MF 10%	50V
C730	1-161-063-00	CERAMIC 0.1MF 10%	50V
C731	1-161-063-00	CERAMIC 0.1MF 10%	50V
C732	1-161-063-00	CERAMIC 0.1MF 10%	50V
C733	1-161-063-00	CERAMIC 0.1MF 10%	50V
C734	1-161-063-00	CERAMIC 0.1MF 10%	50V
C735	1-161-063-00	CERAMIC 0.1MF 10%	50V
		<CONNECTOR>	
CN1	1-506-475-11	PIN, CONNECTOR 10P	
CN2	1-506-470-11	PIN, CONNECTOR 5P	
CN3	1-506-473-11	PIN, CONNECTOR 8P	
CN4	1-506-479-11	PIN, CONNECTOR 14P	
CN5	1-506-474-11	PIN, CONNECTOR 9P	
CN701	*1-564-321-00	PIN, CONNECTOR 2P	
CN702	*1-564-321-00	PIN, CONNECTOR 2P	
CN703	*1-564-321-00	PIN, CONNECTOR 2P	
CN704	*1-564-243-00	PIN, CONNECTOR 6P	
CN705	1-506-471-11	PIN, CONNECTOR 6P	
CN706	1-506-471-11	PIN, CONNECTOR 6P	
CN707	1-506-468-11	PIN, CONNECTOR 3P	
CN708	1-506-470-11	PIN, CONNECTOR 5P	
CN709	1-506-472-11	PIN, CONNECTOR 7P	

The components identified by shading and marked ⚠ are critical for safety.
Replace only with the part number specified.

Ref.No	Part No.	Description	Remark
CN710	*1-508-796-00	PIN, CONNECTOR 2P	
		<DIODE>	
D5	8-719-016-42	DIODE MC932	
D701	8-719-230-02	DIODE 30DF2	
D702	8-719-230-02	DIODE 30DF2	
D703	8-719-230-02	DIODE 30DF2	
D704	8-719-230-02	DIODE 30DF2	
D705	8-719-230-02	DIODE 30DF2	
D706	8-719-230-02	DIODE 30DF2	
D707	8-719-230-02	DIODE 30DF2	
D708	8-719-230-02	DIODE 30DF2	
D709	8-719-200-77	DIODE 10E2N	
D710	8-719-200-02	DIODE 10E2	
		<FUSE>	
F1	⚠1-532-078-11	FUSE, TIME-LAG	
FH701	1-533-162-00	HOLDER, FUSE	
FH702	1-533-162-00	HOLDER, FUSE	
		<IC>	
IC1	8-759-059-45	IC UPD75104CW-271	
IC2	8-759-922-96	IC S-8051ANR	
IC4	8-759-107-51	IC CXQ71051P	
IC5	8-759-013-15	IC MC145411P	
IC6	8-759-011-83	IC MC145406P	
IC7	8-759-921-17	IC SN74HC153AN	
IC701	8-759-701-87	IC NJM7909FA	
IC702	8-749-931-22	IC SI-3122V	
		<TRANSISITOR>	
Q701	8-729-119-78	TRANSISTOR 2SC2785-HFE	
		<RESISTOR>	
R1	1-249-441-11	CARBON 100K 5% 1/4W	
R2	1-249-409-11	CARBON 220 5% 1/4W	
R3	1-249-409-11	CARBON 220 5% 1/4W	
R4	1-249-409-11	CARBON 220 5% 1/4W	
R5	1-249-409-11	CARBON 220 5% 1/4W	
R6	1-249-409-11	CARBON 220 5% 1/4W	
R7	1-249-409-11	CARBON 220 5% 1/4W	
R8	1-249-409-11	CARBON 220 5% 1/4W	
R9	1-249-409-11	CARBON 220 5% 1/4W	
R10	1-249-409-11	CARBON 220 5% 1/4W	
R11	1-249-409-11	CARBON 220 5% 1/4W	
R24	1-247-903-00	CARBON 1M 5% 1/4W	
R31	1-249-437-11	CARBON 47K 5% 1/4W	
R32	1-249-437-11	CARBON 47K 5% 1/4W	
R37	1-249-437-11	CARBON 47K 5% 1/4W	
R38	1-249-436-11	CARBON 39K 5% 1/4W	
R39	1-247-889-00	CARBON 270K 5% 1/4W	
R40	1-249-409-11	CARBON 220 5% 1/4W	
R41	1-249-429-11	CARBON 10K 5% 1/4W	
R701	1-249-429-11	CARBON 10K 5% 1/4W	
R702	1-212-960-00	FUSIBLE 12 5% 1/2W	F
R703	⚠1-202-719-00	SOLID 1M 10% 1/2W	
		<RESISTOR BLOCK>	
RB1	1-233-005-11	COMPOSITION CIRCUIT BLOCK	
RB2	1-233-005-11	COMPOSITION CIRCUIT BLOCK	
RB3	1-233-005-11	COMPOSITION CIRCUIT BLOCK	
		<TRANSFORMER>	
T701	⚠1-421-357-31	TRANSFORMER, LINE FILTER	
		<HARNESS>	
W1	*1-949-294-11	HARNESS (W002)	
W2	*1-948-785-11	HARNESS (WIRE, GROUND W002)	
W3	*1-948-786-11	HARNESS (WIRE, GROUND W003)	
		<CRYSTAL>	
X1	1-567-160-21	OSCILLATOR, CERAMIC	
X3	1-567-889-11	VIBRATOR, CRYSTAL	

****

Ref.No	Part No.	Description	Remark
	*A-7170-140-A	MOUNTED PCB, RP-67 ******************	
	1-562-261-61	CONNECTOR, COAXIAL (BNC)	
		<CAPACITOR>	
C501	1-163-141-00	CERAMIC CHIP 0.001MF 5% 50V	
		<CONNECTOR>	
CN508	1-566-850-21	CONNECTOR, (S) TERMINAL 4P	
CN515	1-566-850-21	CONNECTOR, (S) TERMINAL 4P	
CN518	1-563-344-11	CONNECTOR, D-SUB 25P	
CN519	1-507-792-00	JACK	
		<DIODE>	
D506	8-719-108-12	DIODE RD9.1EW	
D509	8-719-108-12	DIODE RD9.1EW	
D510	8-719-108-12	DIODE RD9.1EW	
D511	8-719-108-12	DIODE RD9.1EW	
D512	8-719-108-12	DIODE RD9.1EW	
D513	8-719-108-12	DIODE RD9.1EW	
D514	8-719-108-12	DIODE RD9.1EW	
D515	8-719-108-12	DIODE RD9.1EW	
D516	8-719-108-12	DIODE RD9.1EW	
D517	8-719-108-12	DIODE RD9.1EW	
D518	8-719-108-12	DIODE RD9.1EW	
D519	8-719-108-12	DIODE RD9.1EW	
D520	8-719-108-12	DIODE RD9.1EW	
D521	8-719-108-12	DIODE RD9.1EW	
D522	8-719-108-12	DIODE RD9.1EW	
D525	8-719-108-12	DIODE RD9.1EW	
D530	8-719-108-12	DIODE RD9.1EW	
D531	8-719-108-12	DIODE RD9.1EW	
		<RESISTOR>	
R502	1-216-049-00	METAL GLAZE 1K 5% 1/10W	
		<SWITCH>	
SW501	1-570-178-11	SWITCH, SLIDE	
SW502	1-570-178-11	SWITCH, SLIDE	
SW503	1-554-248-00	SWITCH, DIP	
		<HARNESS>	
W519	*1-945-817-11	HARNESS (IR-07)	

Ref.No	Part No.	Description	Remark
W520	*1-945-817-11	HARNESS (IR-07)	
W521	*1-945-815-11	HARNESS (IR-05)	
W522	*1-945-816-11	HARNESS (IR-06)	
W523	*1-945-816-11	HARNESS (IR-06)	
W524	*1-945-820-11	HARNESS (PR-03)	
W525	*1-945-821-11	HARNESS (PR-04)	
W526	*1-945-812-11	HARNESS (IR-02)	
W527	*1-945-813-11	HARNESS (IR-03)	
W528	*1-945-814-11	HARNESS (IR-04)	
W529	*1-945-814-11	HARNESS (IR-04)	
W530	*1-945-811-11	HARNESS (IR-01)	
**			
	*A-7170-141-A	MOUNTED PCB, RE-84 ******************	
		<DIODE>	
D401	8-719-200-02	DIODE 11E2	
		<IC>	
IC401	8-749-920-71	IC SI-3522V	
		<HARNESS>	
W401	*1-945-818-11	HARNESS (PR-01)	
**			
	*A-7170-142-A	MOUNTED PCB, RE-85 *******************	
		<DIODE>	
D601	8-719-200-02	DIODE 11E2	
		<IC>	
IC601	8-749-900-06	IC SI-3922V	
		<HARNESS>	
W601	*1-945-819-11	HARNESS (PR-02)	
**			
	*A-7170-143-A	MOUNTED PCB, FP-42 *******************	
	*3-662-205-00	HOLDER (E), LED	
		<CAPACITOR>	
C101	1-161-051-00	CERAMIC 0.01MF 10% 25V	
C102	1-161-051-00	CERAMIC 0.01MF 10% 25V	
		<DIODE>	
D101	8-719-918-96	DIODE AA34225	
D102	8-719-920-05	DIODE SLP281C-50	
D103	8-719-920-05	DIODE SLP281C-50	
D104	8-719-802-03	DIODE TLYG208	
D108	8-719-920-05	DIODE SLP281C-50	
D109	8-719-920-05	DIODE SLP281C-50	

Ref.No	Part No.	Description	Remark
D110	8-719-920-05	DIODE SLP281C-50	
D111	8-719-920-05	DIODE SLP281C-50	
D113	8-719-918-96	DIODE AA34225	
D114	8-719-920-05	DIODE SLP281C-50	
D115	8-719-920-05	DIODE SLP281C-50	
D116	8-719-920-05	DIODE SLP281C-50	
D121	8-719-911-19	DIODE 1SS119	
D122	8-719-911-19	DIODE 1SS119	
D123	8-719-911-19	DIODE 1SS119	
D126	8-719-911-19	DIODE 1SS119	
D127	8-719-911-19	DIODE 1SS119	
		<IC>	
IC101	8-759-932-10	IC MB88306PF	
IC102	8-759-932-10	IC MB88306PF	
		<TRANSISTOR>	
Q101	8-729-900-65	TRANSISTOR DTA144ES	
Q102	8-729-900-65	TRANSISTOR DTA144ES	
		<RESISTOR>	
R101	1-249-410-11	CARBON 270 5% 1/4W	
R102	1-249-410-11	CARBON 270 5% 1/4W	
R103	1-249-410-11	CARBON 270 5% 1/4W	
R104	1-249-410-11	CARBON 270 5% 1/4W	
R107	1-249-410-11	CARBON 270 5% 1/4W	
R108	1-249-410-11	CARBON 270 5% 1/4W	
R109	1-249-410-11	CARBON 270 5% 1/4W	
R110	1-249-410-11	CARBON 270 5% 1/4W	
R111	1-249-410-11	CARBON 270 5% 1/4W	
R113	1-249-410-11	CARBON 270 5% 1/4W	
R114	1-249-410-11	CARBON 270 5% 1/4W	
R115	1-249-410-11	CARBON 270 5% 1/4W	
R116	1-249-410-11	CARBON 270 5% 1/4W	
		<SWITCH>	
SW101	1-572-338-21	SWITCH, PUSH (3 KEY)	
SW102	1-572-338-21	SWITCH, PUSH (3 KEY)	
SW103	1-572-338-21	SWITCH, PUSH (3 KEY)	
SW107	1-572-339-11	SWITCH, PUSH (1 KEY)	
SW108	1-553-856-00	SWITCH, KEY BOARD	
SW109	1-553-856-00	SWITCH, KEY BOARD	
SW110	1-553-856-00	SWITCH, KEY BOARD	
SW111	1-553-856-00	SWITCH, KEY BOARD	
SW112	1-553-856-00	SWITCH, KEY BOARD	
SW113	1-553-856-00	SWITCH, KEY BOARD	
SW114	1-553-856-00	SWITCH, KEY BOARD	
SW115	1-553-856-00	SWITCH, KEY BOARD	
SW116	1-553-856-00	SWITCH, KEY BOARD	
SW117	1-553-856-00	SWITCH, KEY BOARD	
SW118	1-553-856-00	SWITCH, KEY BOARD	
SW119	1-553-856-00	SWITCH, KEY BOARD	
		<HARNESS>	
W101	*1-945-808-11	HARNESS (PF-02)	
W102	*1-945-807-11	HARNESS (PF-01)	
W103	*1-945-822-11	HARNESS (FV-01)	
W104	*1-948-787-11	HARNESS (WIRE, GROUND W101)	
**			

The components identified by shading and marked ⚠ are critical for safety.
Replace only with the part number specified.

Ref.No	Part No.	Description	Remark
	*A-7170-144-A	MOUNTED PCB, VR-126	
		<RESISTOR>	
R301	1-249-429-11	CARBON 10K 5% 1/4W	
R302	1-249-430-11	CARBON 12K 5% 1/4W	
R303	1-249-429-11	CARBON 10K 5% 1/4W	
R306	1-249-427-11	CARBON 6.8K 5% 1/4W	
		<VARIABLE RESISTOR>	
RV302	1-237-318-11	RES, VAR, CARBON (WITH SW)20K	
RV303	1-237-318-11	RES, VAR, CARBON (WITH SW)20K	
RV304	1-237-318-11	RES, VAR, CARBON (WITH SW)20K	
		<HARNESS>	
W301	*1-945-824-11	HARNESS (FV-03)	
W302	*1-945-825-11	HARNESS (FV-04)	
W303	*1-949-581-11	HARNESS (IV-02)	

***

Ref.No	Part No.	Description	Remark
	*A-7170-145-A	MOUNTED PCB, VR-127	
		<CONNECTOR>	
CN201	1-506-484-11	PIN, CONNECTOR 5P	
		<RESISTOR>	
R201	1-249-433-11	CARBON 22K 5% 1/4W	
		<VARIABLE RESISTOR>	
RV201	1-241-026-11	RES, VAR, CARBON 5K	
RV202	1-241-026-11	RES, VAR, CARBON 5K	
		<SWITCH>	
S201	1-572-341-11	SWITCH, ROTARY	
S202	1-572-340-11	SWITCH, ROTARY	
		<HARNESS>	
W202	*1-945-823-11	HARNESS (FV-02)	

***

Ref.No	Part No.	Description	Remark
		MISCELLANEOUS	
CN711	⚠.1-580-375-11	INLET 3P	
M701	1-541-768-11	MOTOR, DC FAN	
S701	⚠.1-570-384-11	SWITCH, SEESAW (AC POWER)	
S702	⚠.1-572-948-11	SWITCH, VOLTAGE SELECTION	
T702	⚠.1-450-781-11	TRANSFORMER, POWER	
	1-543-652-11	CORE, RING	
	*1-945-806-11	HARNESS (FP-02)	
	*1-945-809-11	HARNESS (IP-01)	
	*1-945-810-11	HARNESS (IP-02)	
	*1-945-826-11	HARNESS (IF-01)	
	*1-945-827-11	HARNESS (IF-02)	
	*1-945-828-11	HARNESS (IF-03)	
	*1-945-829-11	HARNESS (IF-04)	
	*1-948-434-11	HARNESS (FP-01)	

***

Ref.No	Part No.	Description	Remark
		ACCESSORIES AND PACKING MATERIALS	
	*X-2127-214-3	ANGLE (1U) ASSY, RACK	
	⚠.1-590-910-11	CORD SET, POWER	
	2-297-913-00	WASHER (DIA.5), ORNAMENTAL	
	*3-174-959-02	INDIVIDUAL CARTON	
	*3-701-619-00	BAG, POLYETHYLENE, STANDARD	
	*3-701-630-00	BAG, POLYETHYLENE	
	*3-744-534-01	CUSHION (REAR)	
	*3-744-535-01	CUSHION (FRONT)	
	3-751-590-11	MANUAL, INSTRUCTION	
	3-751-591-11	MANUAL, INTERFACE	
	7-621-561-39	+K 2.6 × 10	
	7-682-377-04	SCREW +RK 5 × 14	
	7-682-561-04	SCREW +B 4 × 8	

***

Ref.No	Part No.	Description	Remark
		HARDWARE LIST	
		<NUT>	
	7-684-026-04	N 6, TYPE 2	
		<BOLT,HEXAGON SOCKET>	
	7-683-454-04	BOLT,HEXAGON SOCKET 6 × 14	
		<SCREW>	
	7-682-547-09	SCREW +B 3 × 6	
	7-682-554-09	SCREW +B 3 × 25	
	7-682-560-04	SCREW +BVTT 4 × 6 (S)	
	7-685-648-79	SCREW +BVTP 3 × 12 TYPE2	
	7-685-645-79	SCREW +BVTP 3 × 6 TYPE2	
	7-685-646-79	SCREW +BVTP 3 × 8 TYPE2	
	7-685-647-79	SCREW +BVTP 3 × 10 TYPE2	
	7-682-661-09	SCREW +PS 4 × 8	
		<WASHER>	
	7-688-003-01	W 3, SMALL	
	7-623-213-22	SW 6, TYPE 2	

SECTION 7
ELECTRICAL ADJUSTMENTS

During the adjustments, see the arrangement diagram for adjustment parts from page 170.

7-1. PRE-ADJUSTMENT PREPARATIONS

The following measuring equipment are required for electrical adjustment.

7-1-1. Equipment Required

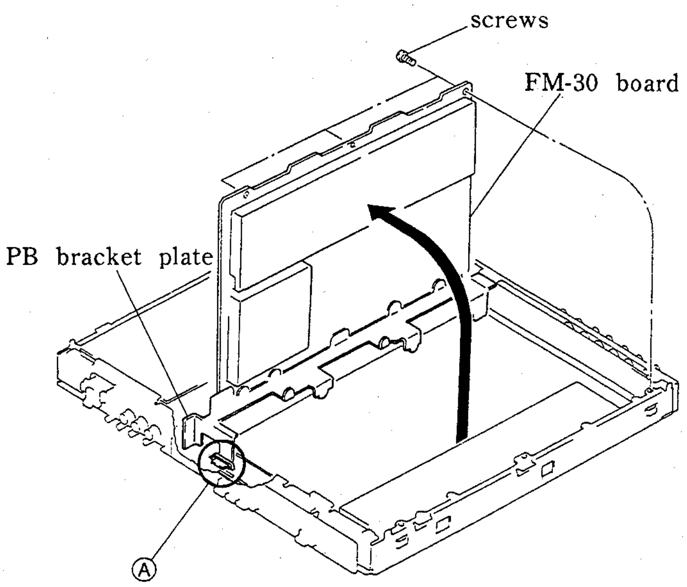
1) Monitor TV with video input or analog RGB input pins.
2) Oscilloscope dual-trace, BandWidth more than 20 MHz, with delay mode.
3) Frequency counter
4) Signal generator
5) Digital voltmeter
6) PAL vectorscope

7-1-2. Signal Generator

Input signal	signal generator
COMPOSITE • 75% color bar (white 100%)	1411 TSG371
S • 75% color bar (white 100%) • COMPOSITE signals subjected to Y/C separation	TSG131
RGB • 100% color bar R 0.7 V p-p G 0.7 V p-p B 0.7 V p-p SYNC 4 V p-p	TSG300
COMPONENT • 75% color bar (white 100%) R-Y 0.525 V p-p B-Y 0.525 V p-p Y 1 V p-p • 100% color bar (white 100%) R-Y 0.7 V p-p B-Y 0.7 V p-p Y 1 V p-p	TSG371

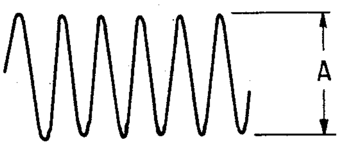
7-1-3. Service Position (FM-30 Board)

Unscrew the three screws of the FM-30 board and the two screws of the bracket, PB plate and then insert the pawl of the bracket, PB plate into the slit in the chassis to secure it as shown at Ⓐ in the illustration.

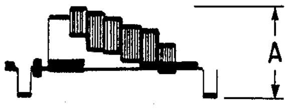


7-2. IV-39 BOARD ADJUSTMENT

7-2-1. Fsc Frequency Level Adjustment

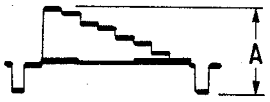
Machine conditions for adjustment	Specification	Adjustment
• No signal • Connect TP503 to GND. (TP507) • After adjustment, disconnect TP503 and GND.	(LEVEL) TP513(F-8)  A = 1 ± 0.02 V p-p	⊘RV505(E-9)
	(FREQUENCY) TP513 (F-8) 4.433.619 ± 20 Hz	⊘RV504(C-9)

7-2-2. Video Amp Adjustment

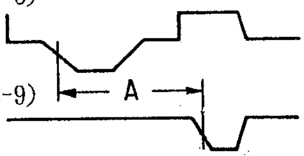
Machine conditions for adjustment	Specification	Adjustment
• Input a 75% color bar to VIDEO IN (Pin ② of CN102). • Connect TP511 to GND(TP512) (ACK → H) • After adjustment, disconnect TP507 and GND.	TP103(J-5)  A = 0.36 ± 0.01 V p-p	⊘RV101(E-5)

7-2-3. Comb Filter Adjustment

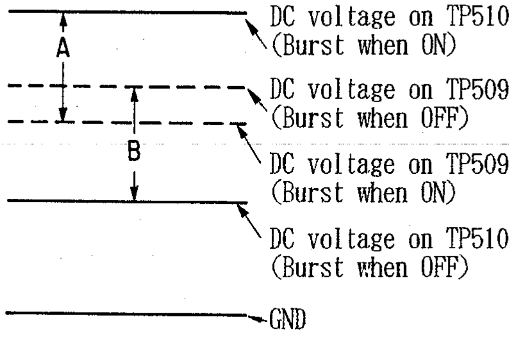
Y output level adjustment

Machine conditions for adjustment	Specification	Adjustment
• Input a 75% color bar to VIDEO IN (Pin ② of CN102).	TP103(J-5)  A = 0.36 ± 0.01 V p-p	⊘RV301(H-8)

7-2-4. Burst Flag Position Adjustment

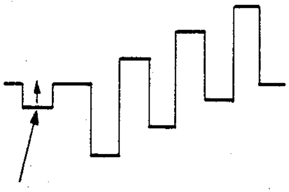
Machine conditions for adjustment	Specification	Adjustment
• Input a 75% color bar to VIDEO IN (Pin ① of CN102). (without burst pulse).	TP103(J-5) TP508(B-9)  A = 5.6 ± 0.1 μ sec	⊘RV503(B-9)

7-2-5. ACK Adjustment

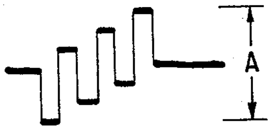
Machine conditions for adjustment	Specification	Adjustment
• Input a 75% color bar to VIDEO IN (Pin ① of CN102) • Burst to ON/OFF.	TP509(B-9) TP510(B-9)  A B DC voltage on TP510 (Burst when ON) DC voltage on TP509 (Burst when OFF) DC voltage on TP509 (Burst when ON) DC voltage on TP510 (Burst when OFF) GND |A-B| ≦ 50 mV	⊘RV506(B-9)

7-2-6. RGB Adjustment

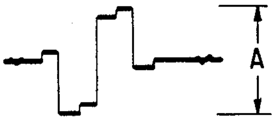
1. Y level check

Machine conditions for adjustment	Specification	Adjustment
• Input a 100% color bar to RGB IN (CN106). Pin ① of CN106 (R IN) Pin ③ of CN106 (G IN) Pin ⑤ of CN106 (B IN) Pin ⑦ of CN106 (SYNC IN) • DIP SW No.5 (ON)	TP703(A-1)  Adjust so that this portion becomes flat.	⊘RV701(K-3)

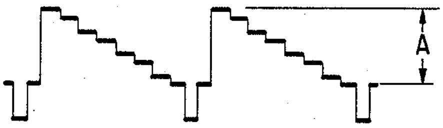
2. B-Y level adjustment

Machine conditions for adjustment	Specification	Adjustment
• Input a 100% color bar to RGB IN (CN106). Pin ① of CN106 (R IN) Pin ③ of CN106 (G IN) Pin ⑤ of CN106 (B IN) Pin ⑦ of CN106 (SYNC IN)	TP703(A-1)  A = 1.33 ± 0.02 V p-p	⊘RV703(D-3)

3. R-Y level adjustment

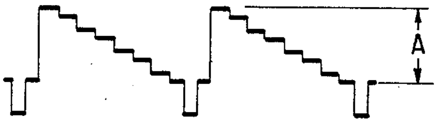
Machine conditions for adjustment	Specification	Adjustment
• Input a 100% color bar to RGB IN (CN106). Pin ① of CN106 (R IN) Pin ③ of CN106 (G IN) Pin ⑤ of CN106 (B IN) Pin ⑦ of CN106 (SYNC IN)	TP702(A-3)  A = 1.33 ± 0.02 V p-p	⊘RV702(D-3)

4. Y level adjustment

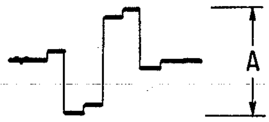
Machine conditions for adjustment	Specification	Adjustment
• Input a 100% color bar to RGB IN (CN106). Pin ① of CN106 (R IN) Pin ③ of CN106 (G IN) Pin ⑤ of CN106 (B IN) Pin ⑦ of CN106 (SYNC IN)	TP701(A-2)  A = 1.2 ± 0.02 V p-p	⊘RV704(C-1)

7-2-7. Component Level Adjustment

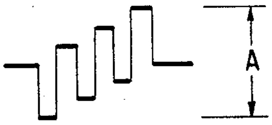
1. Y level adjustment

Machine conditions for adjustment	Specification	Adjustment
• Input a 75% COMPONENT color bar to COMPONENT IN(CN106). Pin ① of CN106 (R-Y IN) Pin ③ of CN106 (Y IN) Pin ⑤ of CN106 (B-Y IN)	TP701(A-2)  A = 1.2 ± 0.02 V p-p	⊘RV707(H-3)

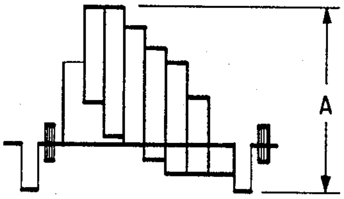
2. R-Y level adjustment

Machine conditions for adjustment	Specification	Adjustment
• Input a 75% COMPONENT color bar to COMPONENT IN(CN106). Pin ① of CN106 (R-Y IN) Pin ③ of CN106 (Y IN) Pin ⑤ of CN106 (B-Y IN)	TP702(A-3)  A = 1 ± 0.02 V p-p	⊘RV705(H-4)

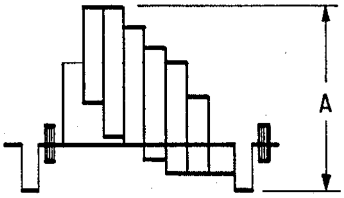
3. B-Y level adjustment

Machine conditions for adjustment	Specification	Adjustment
• Input a 75% COMPONENT color bar to COMPONENT IN. (CN106) Pin ① of CN106 (R-Y IN) Pin ③ of CN106 (Y IN) Pin ⑤ of CN106 (B-Y IN)	TP703(A-2)  A = 1 ± 0.02 V p-p	⊘RV706(G-2)

7-2-8. REF 75 Ω ON / OFF Check

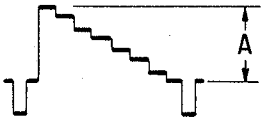
Machine conditions for adjustment	Specification	Adjustment
• Input a 75% color bar to REF IN.	TP903(L-4) Change the ON/OFF status of the rear panel's REF 75Ω switch to check that the level changes.  2±0.15 V p-p (when OFF) 1±0.05 V p-p (when ON) After checking the switch operation, leave the switch set to the ON position.	

7-2-9. VIDEO 75 Ω ON / OFF Check

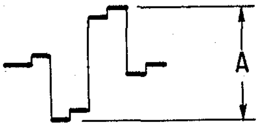
Machine conditions for adjustment	Specification	Adjustment
• Input a 75% color bar to VIDEO IN.	TP901(L-5) Change the ON/OFF status of the rear panel's VIDEO 75Ω switch to check that the level changes.  2±0.15 V p-p (when OFF) 1.0±0.05 V p-p (when ON) After checking the switch operation, leave the switch set to the ON position.	

7-2-10. VIDEO Input Adjustment

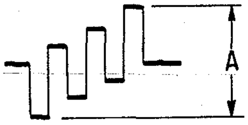
1. Y level adjustment

Machine conditions for adjustment	Specification	Adjustment
• Input a 75% color bar to VIDEO IN.	TP701(A-2)  A = 1.2 ± 0.02 V p-p	⊘RV102(D-4)

2. R-Y level adjustment

Machine conditions for adjustment	Specification	Adjustment
• Input a 75% color bar to VIDEO IN (Pin ① of CN102). • VIDEO 75Ω switch to ON.	TP702(A-3)  A = 1 ± 0.02 V p-p	⊘RV507(B-6)

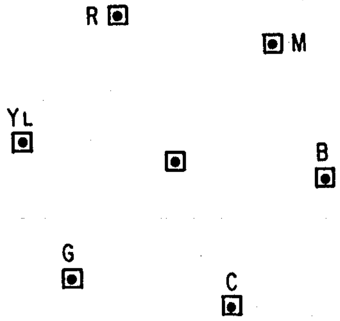
3. B-Y level adjustment

Machine conditions for adjustment	Specification	Adjustment
• Input a 75% color bar to VIDEO IN (Pin ① of CN102). • VIDEO 75Ω switch to ON.	TP703(A-1)  A = 1 ± 0.02 V p-p	⊘RV508 (B-6)

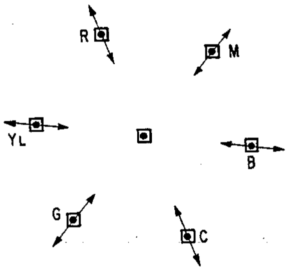
7-2-11. Decoder Output Level Adjustment

Machine conditions for adjustment	Specification	Adjustment
• Input a 75% color bar to VIDEO IN (Pin ① of CN102).	TP503(B-9) 2.54 ± 0.02 V (DC)	⊘RV501(B-8)

7-2-12. Decoder 1H Delay Adjustment

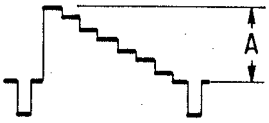
Machine conditions for adjustment	Specification	Adjustment
• Input a 75% color bar to VIDEO IN (Pin ① of CN102).	TP514(E-9) 2.30 ± 0.02 V TP701 or TP707 Y TP702 or TP708 R-Y (GND of chassis) TP703 or TP709 B-Y Y is used as EXT REF. Adjust the H, V GAIN of VFM300A and confirm that each luminescent spot comes within the square frame on the screen. Next, adjust T501 and make sure that each luminescent spot becomes one spot each. In this case, adjust the interval between each luminescent spot so that the differnce evenly becomes as small as possible.  Do not connect the 75Ω end terminal, but input with high impedance. Also, set the screen display to 100%.	⊘RV502(C-8) ⊘T501(E-9)

7-2-13. Color Level Volume Check

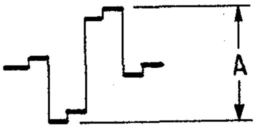
Machine conditions for adjustment	Specification	Adjustment
• Input a 75% color bar to VIDEO IN (Pin ① of CN102).	TP701 Y (A-2) TP702 R−Y (A-3) TP703 B−Y (A-1) Press once on the COLOR LEVEL variable-resistor volume, which is depressed back into the front panel, to project it forward. In this status, rotate the volume from side to side to confirm that the distance changes between each spot of light and the origin point. After confirmation, press the volume again so that it is depressed. 	

7-2-14. S VIDEO Input Adjustment

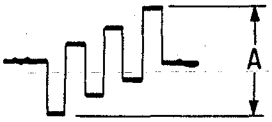
1. Y level check

Machine conditions for adjustment	Specification	Adjustment
• Input a 75% color bar to S IN.	TP701(A-2)  A = 1.2 ± 0.08 V p-p	

2. R-Y level check

Machine conditions for adjustment	Specification	Adjustment
• Input a 75% color bar to S IN.	TP702(A-3)  A = 1.0 ± 0.08 V p-p	

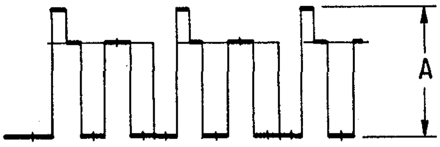
3. B-Y level check

Machine conditions for adjustment	Specification	Adjustment
• Input a 75% color bar to S IN.	TP703 (A-1)  A = 1.0 ± 0.08 V p-p	

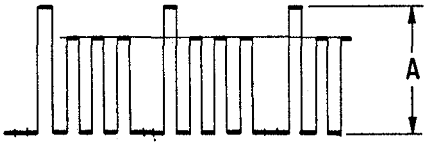
7-3. FM-30 BOARD ADJUSTMENT

7-3-1. R.G.B Matrix adjustment

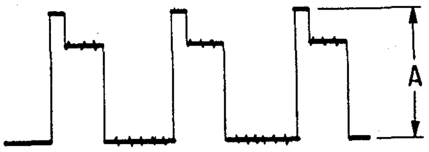
1. R adjustment

Machine conditions for adjustment	Specification	Adjustment
• Input a 75% COMPONENT color bar to COMPONENT IN (CN102). Pin ① of CN106 (R-Y IN) Pin ③ of CN106 (Y IN) Pin ⑤ of CN106 (B-Y IN) (switch No.5 OFF of DIP SW) • Set R.G.B mode is output select switch. (switch No.6 On of DIP SW) • After adjustment, return No.5 and No.6 of DIP SW to its original position. • 75Ω terminated.	TP405(C-1) flat Adjust so that this portion becomes flat.  Adjust so that the waveform shown above is achieved. A = 0.7 ± 0.02 V p-p	⊘RV402(C-4) ⊘RV407(C-2)

2. B adjustment

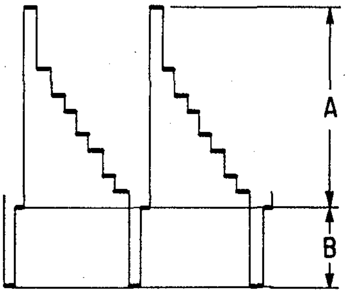
Machine conditions for adjustment	Specification	Adjustment
• Input a 75% COMPONENT color bar to COMPONENT IN (CN106). Pin ① of CN106 (R-Y IN) Pin ③ of CN106 (Y IN) Pin ⑤ of CN106 (B-Y IN) (switch No.5 OFF of DIP SW) • Set R.G.B mode is output select switch. (switch No.6 ON of DIP SW) • After adjustment, return No.5 and No.6 of DIP SW to its original position. • 75Ω terminated.	TP401(A-1) Adjust so that this portion becomes flat.  Adjust so that the waveform shown above is achieved. A = 0.7 ± 0.02 V p-p	⊘RV401(A-4) ⊘RV406(B-2)

3. G adjustment

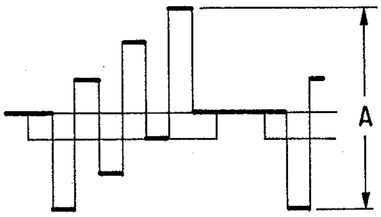
Machine conditions for adjustment	Specification	Adjustment
• Input a 75% COMPONENT color bar to COMPONENT IN (CN106). Pin ① of CN106 (R-Y IN) Pin ③ of CN106 (Y IN) Pin ⑤ of CN106 (B-Y IN) (switch No. 5 OFF of DIP SW) • Set R.G.B mode is output select switch. (switch No. 6 ON of DIP SW) • After adjustment, return No. 5 and No. 6 of DIP SW to its original position. • 75Ω terminated.	TP403(B-1) Adjust so that this portion becomes flat.  Adjust so that the waveform shown above is achieved. A = 0.7 ± 0.02 V p-p	⊘RV403(B-4) ⊘RV404(B-4) ⊘RV405(B-2)

7-3-2. Component Output Adjustment

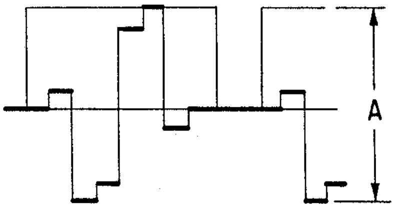
1. Y adjustment

Machine conditions for adjustment	Specification	Adjustment
• Input a 100% COMPONENT color bar to COMPONENT IN (CN106). Pin ① of CN106 (R-Y IN) Pin ③ of CN106 (Y IN) Pin ⑤ of CN106 (B-Y IN) (switch No. 5 OFF of DIP SW) • Set COMPONENT mode is output select switch. • After adjustment, return No. 6 of DIP SW to its original position. • 75Ω terminated.	TP403(B-1)  Adjust so that the waveform shown above is achieved. A = 0.7 ± 0.02 V p-p B = 0.3 ± 0.02 V p-p	⊘RV421(D-2) ⊘RV410(D-1)

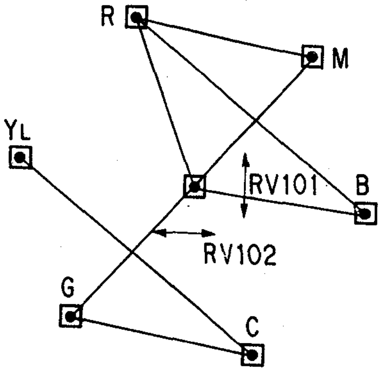
2. B-Y adjustment

Machine conditions for adjustment	Specification	Adjustment
• Input a 100% COMPONENT color bar to COMPONENT IN (CN106). Pin ① of CN106 (R-Y IN) Pin ③ of CN106 (Y IN) Pin ⑤ of CN106 (B-Y IN) (switch No.5 OFF of DIP SW) • Set COMPONENT mode is output select switch. • After adjustment, return No.6 of DIP SW to its original position. • 75Ω terminated.	TP401(A-1)  Adjust so that the waveform shown above is achieved. A = 0.7 ± 0.02 V p-p	⊘RV420(A-4)

3. R-Y adjustment

Machine conditions for adjustment	Specification	Adjustment
• Input a 100% COMPONENT color bar to COMPONENT IN (CN106). Pin ① of CN106 (R-Y IN) Pin ③ of CN106 (Y IN) Pin ⑤ of CN106 (B-Y IN) • Set COMPONENT mode is output select switch. (switch No.6 ON of DIP SW) • After adjustment, return No.6 of DIP SW to its original position. • 75Ω terminated.	TP405(B-1)  Adjust so that the waveform shown above is achieved. A = 0.7 ± 0.02 V p-p	⊘RV419(B-4)

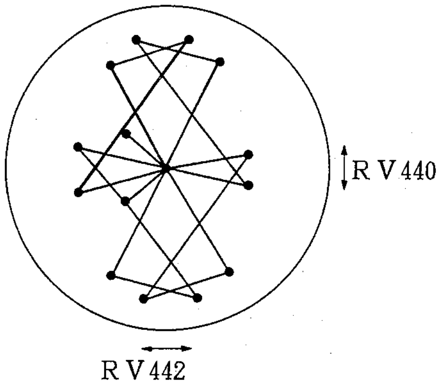
7-3-3. Clamp Adjustment

Machine conditions for adjustment	Specification	Adjustment
• Input a 75% COMPONENT color bar to COMPONENT IN (CN106). Pin ① of CN106 (R-Y IN) Pin ③ of CN106 (Y IN) Pin ⑤ of CN106 (B-Y IN) (switch No.5 OFF of DIP SW) • Set COMPONENT mode is output select switch. (switch No.6 OFF of DIP SW)	 Adjust so that the waveform shown above is achieved.	⊘RV101(G-4) ⊘RV102(F-5)

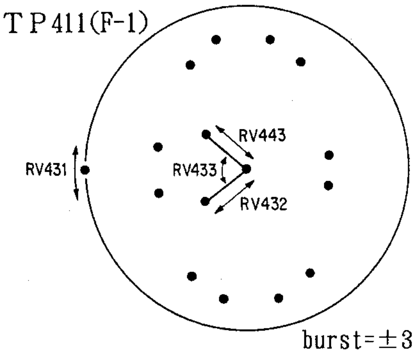
7-3-4. 4 fsc Adjustment

Machine conditions for adjustment	Specification	Adjustment
• No signal.	TP905(K-2) 17.734.475 ± 5 Hz	⊘RV901(I-3)

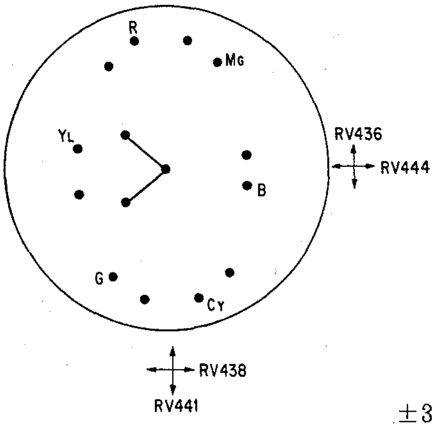
7-3-5. Carrier Balance Adjustment

Machine conditions for adjustment	Specification	Adjustment
• Input a 75% color bar to VIDEO IN (Pin ① of CN102). • Adjust RV440, 442 so that the origin point on the vectorscope.	TP411(F-1)  	⊘RV440(F-2) ⊘RV442(F-3)

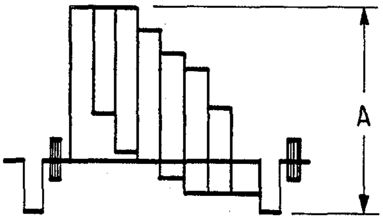
7-3-6. Burst Flag Level Adjustment

Machine conditions for adjustment	Specification	Adjustment
• Input a 75% color bar to VIDEO IN (Pin ① of CN102). • Set the REF VIDEO is OFF. • Adjust RV431, 432, 433, 443 so that the burst flag is in the BF position (75%) of the vectorscope. • 75Ω terminated.	TP411(F-1)  burst=±3° ±5% SHC=±10°	⊘RV431(G-3) ⊘RV432(G-4) ⊘RV433(F-4) ⊘RV443(G-3)

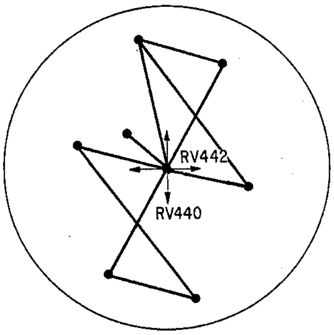
7-3-7. Chroma Adjustment

Machine conditions for adjustment	Specification	Adjustment
• Input a 75% color bar to VIDEO IN (Pin ① of CN102). • Adjust RV436, 444 so that the B. Y_L spot is in the blue yellow position of the vectorscope. • Adjust RV438, 441 so that the R. M_G. C_Y. G spots is in the red, magenta, cyan green position of the vectorscope. • 75Ω terminated.	TP411(F-1)  R MG YL B G CY RV436 RV444 RV438 RV441 ±3° ±5%	⊘RV436(F-4) ⊘RV444(H-3) ⊘RV438(E-4) ⊘RV441(E-3)

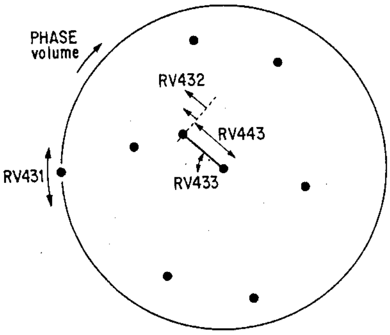
7-3-8. Composite Y Level Adjustment

Machine conditions for adjustment	Specification	Adjustment
• Input a 75% color bar to VIDEO IN (Pin ① of CN102). • 75Ω terminated.	TP411(F-1)  A = 1 ± 0.02 V p-p	⊘RV416(F-2)

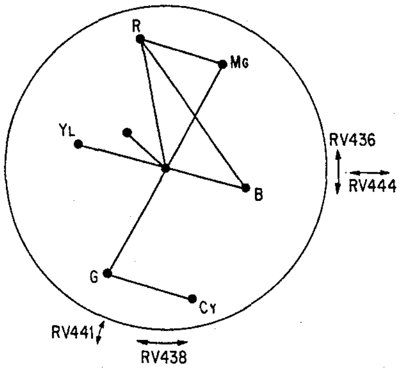
7-3-9. Carrier Balance Adjustment

Machine conditions for adjustment	Specification	Adjustment
• Input a 75% color bar to VIDEO IN (Pin ① of CN102). • Set the vectorscope is VECT +V mode and GAIN is ×5 position. • Adjust RV440, 442 so that the origin point on the vectorscope.		⊘RV440(F-2) ⊘RV442(F-3)

7-3-10. Burst Flag Level Adjustment

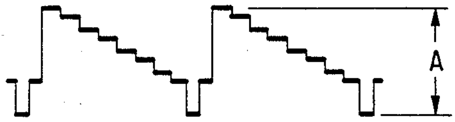
Machine conditions for adjustment	Specification	Adjustment
• Input a 75% color bar to VIDEO IN (Pin ① of CN102). • Set the REF VIDEO is OFF. • Set the vectorscope is VECT +SCH +V mode and GAIN is ×1 position. • Adjust the PHASE volume of the vector so that the 2 bursts of +V/-V coincide. • Adjust RV431 so that the luminescent spot of SCH coincides at 0° . • Adjust RV432 so that the size of the 2 bursts coincide. • Adjust the angle of RV433 so that the burst comes to a position of 75%. • Adjust RV433 so that the size of the burst comes to a position of 75%. • 75Ω terminated.	 burst = ±3° ± 5% SCH = ±10°	⊘RV431(G-3) ⊘RV432(G-4) ⊘RV433(F-4) ⊘RV443(G-3)

7-3-11. Chroma Adjustment

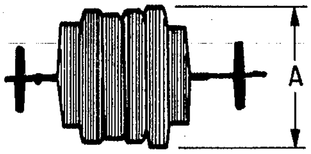
Machine conditions for adjustment	Specification	Adjustment
• Input a 75% color bar to VIDEO IN (Pin ① of CN102). • Set the vectorscope is VECT +V mode. • Adjust the PHASE volume of the vector so that the 2 bursts of +V/-V coincide. • Adjust RV436 so that the luminescent spot for each +V/-V of B, Y_L become one. • Adjust RV444 so that the luminescent spots of B, Y_L meet the scale. • Adjust RV438 so that each +V/-V of R, M_G, C_Y and G coincides. • Adjust RV441 so that the luminescent spots of R, M_G , C_Y and G meet the scale. • 75Ω terminated.	 R MG YL RV436 RV444 B G CY RV441 RV438	⊘RV436(F-4) ⊘RV444(H-3) ⊘RV438(E-4) ⊘RV441(E-3)

7-3-12. S OUT Adjustment

1. Y level adjustment

Machine conditions for adjustment	Specification	Adjustment
• Input a 75% color bar to VIDEO IN (Pin ① of CN102). • 75Ω terminated.	TP409(E-1)  A = 1 ± 0.02 V p-p	⊘RV412(E-2)

2. Chroma level adjustment

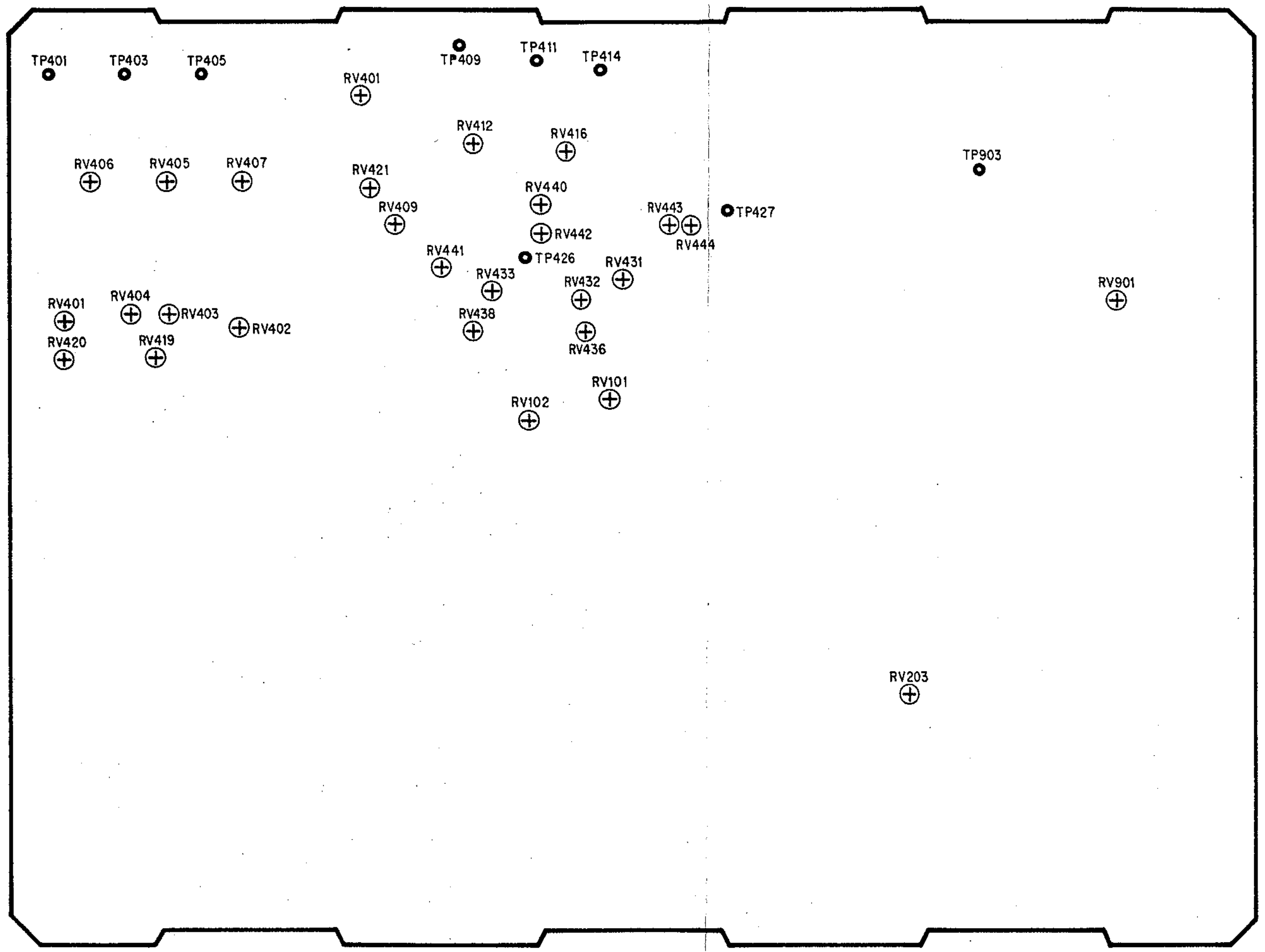
Machine conditions for adjustment	Specification	Adjustment
• Input a 75% color bar to VIDEO IN (Pin ① of CN102). • 75Ω terminated.	TP414(G-1)  A = 0.3 ± 0.02 V p-p	⊘RV423(E-3)

7-3-13. Input VIDEO Position Adjustment

Machine conditions for adjustment	Specification	Adjustment
• Input a MONOSCOPE to VIDEO IN. (Pin① of CN102) • Adjust the RV203 so that the meet power OFF and power ON signal on the monitor.		⊘RV203(J-7)

7-4. ARANGEMENT DIAGRAM FOR ADJUSTMENT PARTS

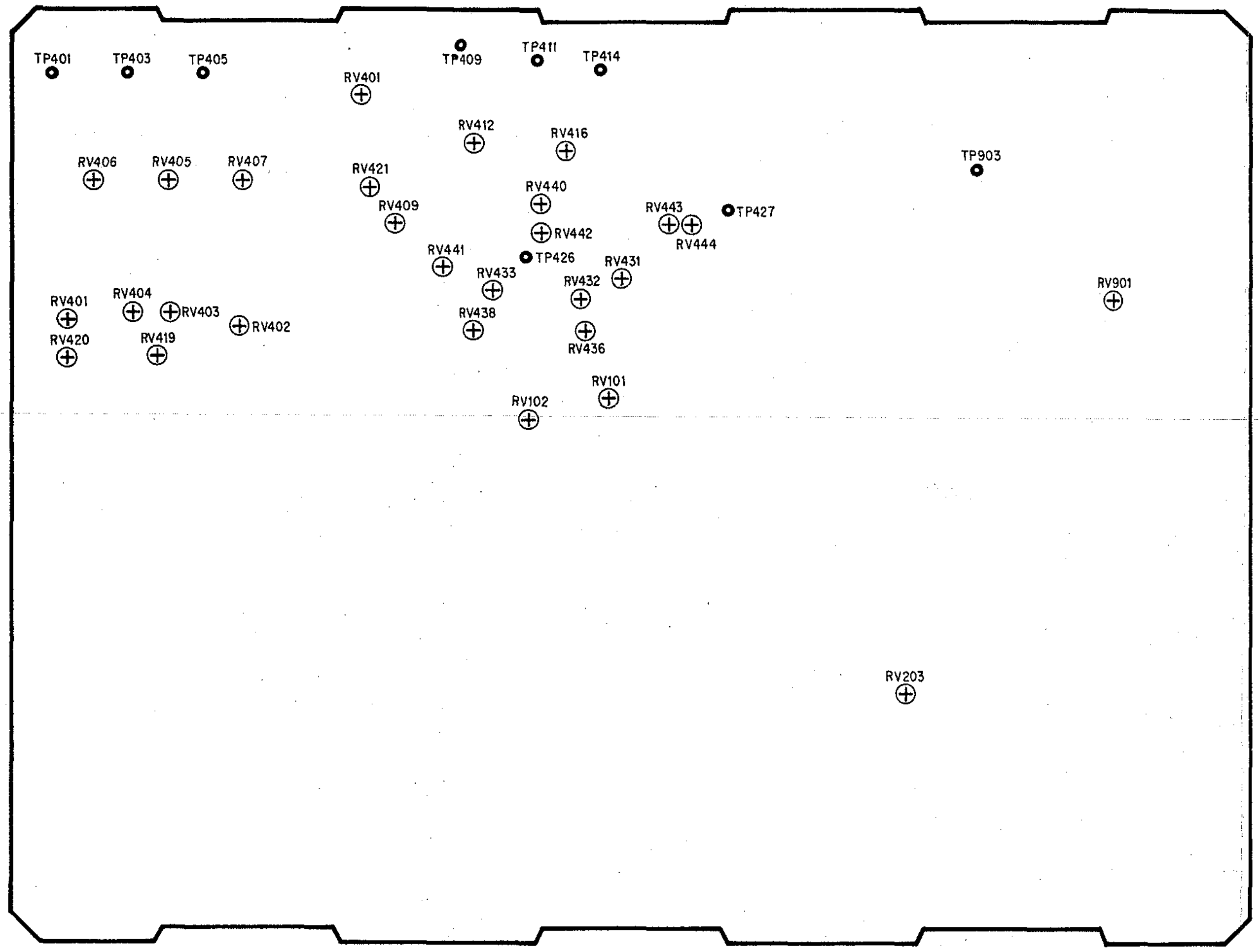
FM-30 BOARD (COMPONENT SIDE)


TP401
TP403
TP405
RV401
TP409
TP411
TP414
RV412
RV416
RV406
RV405
RV407
RV421
RV409
RV440
RV442
RV443
RV444
TP427
TP903
TP426
RV441
RV433
RV432
RV431
RV438
RV436
RV401
RV404
RV403
RV402
RV420
RV419
RV101
RV102
RV901
RV203

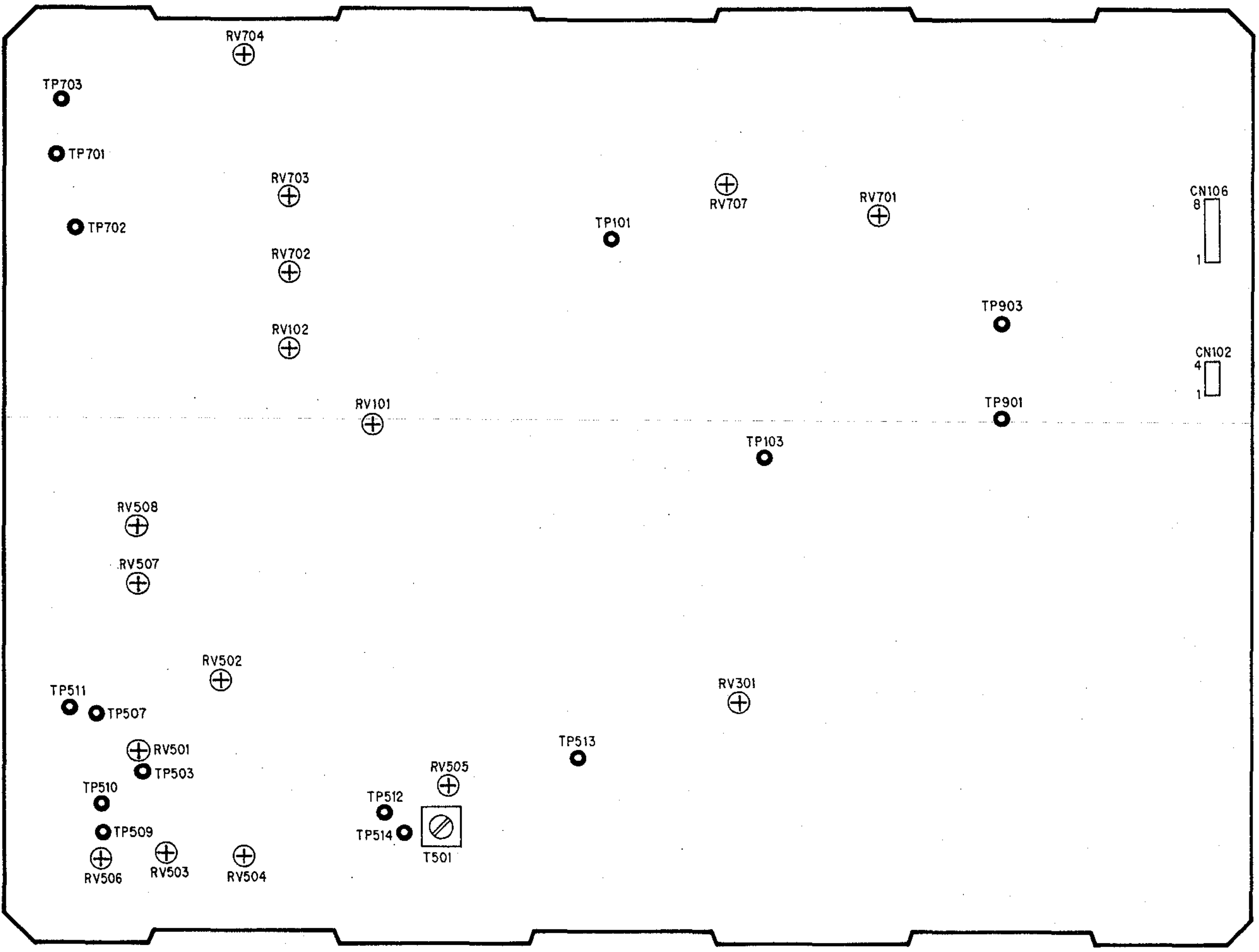
IV-39

7-4. ARANGEMENT DIAGRAM FOR ADJUSTMENT PARTS

FM-30 BOARD (COMPONENT SIDE)


TP401
TP403
TP405
RV401
TP409
TP411
TP414
RV412
RV416
RV406
RV405
RV407
RV421
RV409
RV440
RV442
RV443
RV444
TP427
TP903
RV441
TP426
RV433
RV432
RV431
RV901
RV401
RV404
RV403
RV402
RV438
RV436
RV420
RV419
RV101
RV102
RV203

IV-39 BOARD (COMPONENT SIDE)


RV704
TP703
TP701
RV703
TP702
RV702
RV102
RV707
TP101
RV701
CN106
8
1
TP903
CN102
4
1
RV101
TP901
TP103
RV508
RV507
RV502
TP511
TP507
RV501
TP503
TP510
TP509
RV506
RV503
RV504
TP512
TP514
T501
RV505
TP513
RV301

SONY

→ 2013135

nicht im Rechner vorhanden

FRAME MEMORY UNIT

MPU-F100P

SERVICE MANUAL

SUPPLEMENT-1

Please add and replace your manual with this SUPPLEMENT-1.

SUBJECT

- CIRCUIT DESCRIPTION

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1. SPECIFICATIONS

Input connectors

Composite video input	BNC connector, 1.0 Vp-p, 75 ohms unbalanced, sync negative
S video input	S connector Y: 1.0 Vp-p, 75 ohms unbalanced, sync negative C: 0.3 Vp-p, 75 ohms unbalanced
R.G.B.	BNC connector, 0.7 Vp-p, 75 ohms unbalanced SYNC: BNC connector, 1.0 – 4.0 Vp-p, 75 ohms unbalanced, sync negative
R—Y/Y/B—Y *	Y: 1.0 Vp-p, 75 ohms unbalanced, sync negative R—Y : 0.7 Vp-p, 75 ohms unbalanced B—Y : 0.7 Vp-p, 75 ohms unbalanced
Reference video	1.0 Vp-p, 75 ohms unbalanced, sync negative Composite video or black burst signal

Output connectors

Composite video output	BNC connector, 1.0 Vp-p, 75 ohms unbalanced, sync negative
S video output	S connector Y: 1.0 Vp-p, 75 ohms unbalanced, sync negative C: 0.3 Vp-p, 75 ohms unbalanced
R.G.B.	BNC connector, 0.7 Vp-p, 75 ohms unbalanced SYNC: BNC connector, 4.0 Vp-p, 75 ohms unbalanced, sync negative
R—Y/Y/B—Y *	Y: 1.0 Vp-p, 75 ohms unbalanced, sync negative R—Y : 0.7 Vp-p, 75 ohms unbalanced B—Y : 0.7 Vp-p, 75 ohms unbalanced

* RGB input/output signal and R—Y/Y/B—Y input/output signal can be selected by the DIP switch.

Control signal connectors

RS-232C	25-pin, D-sub
External control	Mini jack

Others

Memory input	Odd field, even field, and frame
Picture effects	Lap dissolve (transition duration 1.5 sec) Mosaic Posterization (solarization) Multi-picture (3 x 3)
Sync lock	Horizontal sync phase: –0.5 to +1μsec Subcarrier phase: 0° to 360°
Operating temperature	5° to 35°C (41° to 95°F)
Storage temperature	–10° to 60°C (14° to 140°F)
Power requirements	220, 230, 240 V AC selectable, 50 Hz
Power consumption	0.2 A max
Dimensions	Approx. 424 x 54 x 446 mm (wxhxd) ($16\frac{3}{4}$ x $2\frac{1}{8}$ x $17\frac{5}{8}$ inches) including projections
Weight	6.4 kg (14 lb 2 oz)
Supplied accessories	Power cable (1) Rack angles (2) Washers (4) Screws (+RK5 x 14) (4) Screws (+B4 x 8) (4) Interface manual (1)

Design and specifications subject to change without notice.

2. POWER SUPPLY AND SYSTEM CONTROL

The power supply unit consists of PS-271 board, RE-84 board and RE-85 board. The PS-271 board incorporates both the power supply and system control circuits.

2-1. POWER SUPPLY

The power supply circuit generates the following four types of power.

a. REG +5 V (Video system, Memory system, System control, etc.)
b. REG +9 V (Video system, Memory system, System control, etc.)
c. REG +12 V (DC fan.)
d. REG −9 V (Memory system (GEN LOCK, ENCODER), System control)

[Actuation]

When the Power Supply SW (S701) is turned ON, AC POWER SUPPLY is passed through a circuit protection fuse (F001) and line filter (T701), and is supplied to power transformer (T702).
Details of REG +5 V, +9 V, +12 V, −9 V follow :

REG +5 V

8.01 V is output from the power supply transformer. It is then full wave rectified at D701 through D704, input to the RE-84 board and stabilized to +5 V at IC401, D401.

REG +9 V

11.9 V is output from the power supply transformer. It is then full wave rectified at D705 through D708, input to the RE-85 board and stabilized to +9 V at IC601, D601.

REG +12 V

11.9 V is output from the power supply transformer. It is then full wave rectified at D705 through D708 and stabilized to +12 V at IC702, D710 located on the PS-271 board.

REG −9 V

12.8 V is output from the power supply transformer. At D709 it is half wave rectified and stabilized at −9 V at IC701.

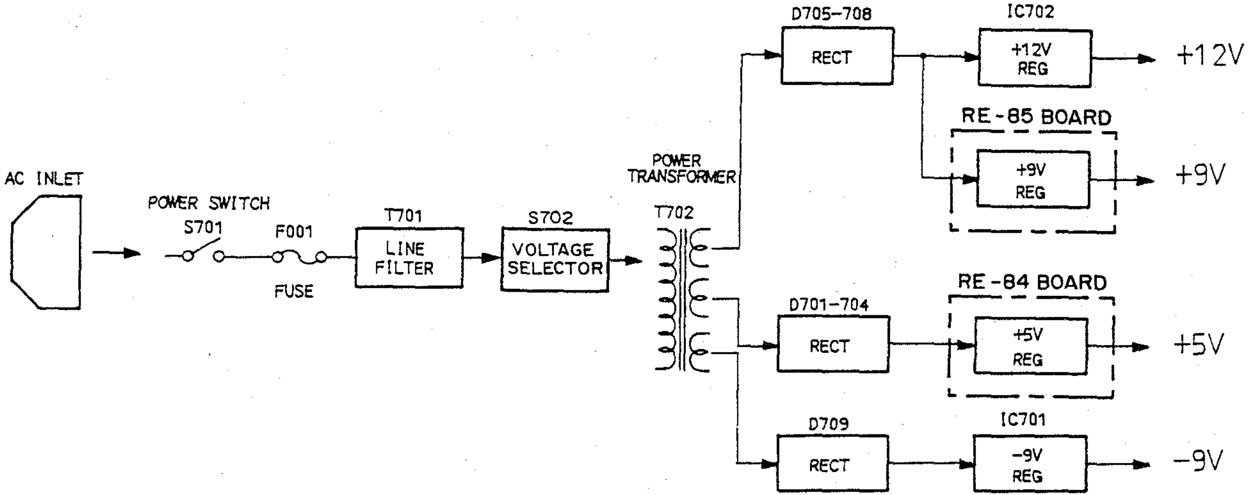

D705–708
RECT
IC702
+12V REG
+12V
RE-85 BOARD
+9V REG
+9V
AC INLET
POWER SWITCH
S701
F001
FUSE
T701
LINE FILTER
S702
VOLTAGE SELECTOR
POWER TRANSFORMER
T702
RE-84 BOARD
D701–704
RECT
+5V REG
+5V
D709
RECT
IC701
−9V REG
−9V

Fig. 2-1 Power Supply Block Diagram

2-2. SYSTEM CONTROL

The system control of PS-271 board consists of 6 ICs IC001, IC002, IC004 to IC007.

Details of each IC follow :

2-2-1. IC001 μPD75104CW-271 (SYSTEM CONTROL)

Key Scan

Reads the position of the tact and push switches on the front panel (FP-42 board). [Controls Frame memory, input signal (video, S-video, component) comply with key positions].

LED Control

Controls ON/OFF of front panel LED (FP-42 board). (IC101, IC102 on the FP-42 board : Transmits serial data to LED Driver and controls)

Frame Memory Control

Transmits serial data to IC207 on the FM-30 board, and controls Frame Memory. (FREEZE, FRAME, ODD, EVEN, MOSAIC, POSTERIZATION, MULTI, DISSOLVE, Noise reduction : Y-NR, C-NR, etc.)

RC-232C Control

Controls IC004 (CXQ71051P : Serial Control Unit) (Outputs and inputs 8 bit data in parallel)

2-2-2. IC002 S-8051ANR (RESET)

Outputs reset pulse to IC001 (μPD75104CW-271) at power supply rise and fall.

2-2-3. IC004 CXQ71051P (SERIAL CONTROL UNIT)

UART (Universal Asynchronous Receiver/Transmitter) for RS-232C.
Transmission between system control IC (IC001) and IC004 is an 8 bit parallel data transmission.

Used Mode — Asynchronous mode (×16 clock), Character : 8 bit, No parity, Stop bit : 1 bit).

2-2-4. IC005 MC145411P (BIT RATE GENERATOR)

Baud rate generator for RS-232C. When setting RSA : pin 15 = "High" , RSB : pin 14 = "High" , OUTPUT CLOCK RATE is used as ×64 mode. Crystal (X003) generated frequency : 1.8432 MHz is divided and 4 types of clock (153.6, 76.8, 38.4, 19.2 kHz) are output to the baud rate selector (IC007). Also, 1.8432 MHz is output from pin 11 and used as clock (CLK : Pin 20) for IC004 : CXQ71051P.

2-2-5. IC006 MC145406P (RS-232C DRIVER/RECEIVER)

3 DRIVER/3 RECEIVER

Driver ··· Input : TTL level, Output : ±9 V

Receiver ··· Input range : ±25 V, Output : TTL level

Pins 2, 4 and 6 are the receiver input; Pins 3, 5 and 7 are the driver output; Pins 10, 12 and 14 are the driver input; and Pins 11, 13 and 15 are the receiver output. The input/output carried out between Pins 2-15, 3-14, 4-13, 5-12, 6-11 and 7-10, and each of them comprises an inverter. Pins 2 to 7 operate at ±9 V and Pins 10 to 15 operate at 0 V and 5 V.

2-2-6. IC007 SN74HC153N (BAUD RATE SELECTOR)

The clock (153.6, 76.8, 38.4, 19.2 kHz) that are output from IC005 (MC145411P) are selected according to the condition of Pin 14 of IC007 (DIP 1) and Pin 2 (DIP 2), and the clock is output from Pin 7 of IC007. These clocks are input to Pin 10 (TxC) and Pin 25 (RxC) of IC004 (CXQ71051P), and they are used as a transmission reference clock and a reception reference clock. As IC004 is used in ×16 clock mode and therefore becomes :

19.2 kHz = 1200 baud, 38.4 kHz = 2400 baud, 76.8 kHz = 4800 baud and 153.6 kHz = 9600 baud.

3. IV-39 BOARD

3-1. GENERAL

The IV-39 board is a block with functions for processing the various input video signals into Y/R−Y/B−Y component signals. The processed signals are output to the next block, the FM-30 board. Here is the circuit configuration.

- RGB input matrix

  This block converts RGB input signals into Y/R−Y/B−Y component signals that become a matrix circuit using a resistor.

- Y/color difference input circuit

  This is the input circuit for Y, R−Y and B−Y signals.

- Video input Y/C separation circuit (comb filter)

  This block separates the input video signals into the brightness signal component (Y) and the color signal component (C). This block comprises the digital comb filter with IC.

- S-Video input circuit

  This is the S-Video input circuit. It inputs to the C signal circuit the Y signal selected with the analog switch and the composite video Y signal made by selecting the chroma signal with the analog switch and separating the Y and C components.

- Chroma decoder

  This block decodes the chroma component separated by the comb filter and the chroma component input to the S-Video circuit into R−Y and B−Y signals.

- Relay circuit

  This circuit connects the input and output terminals so that even when this unit's power is off, the input signals are output as is at the output terminals.

3-2. RGB INPUT MATRIX

This block creates the Y/R−Y/B−Y signals from the R/G/B/SYNC signals. The R, G, and B signals go through the Q701, Q710 and Q713 buffer amps, respectively and generates Y, R−Y and B−Y signals by a resistance matrix circuit. The component ratios are determined by the following equations :

$$Y=0.3R+0.59G+0.11B$$

$$B-Y=-0.3R-0.59G+0.89B$$

$$R-Y=0.7R-0.59G-0.11B$$

The Y signal is determined by the composite resistance ratio for R708, R710 and R711. Since the SYNC signal must be added to the Y signal, SYNC is added with Q755 and Q724. The addition SYNC signal used is the one waveformed with Q753 to Q755. The permitted input level here is 1.0 V to 4.0 V. Then, this signal goes through the color difference/RGB switching circuit, IC702, enters a low pass filter, then is input to the phase compensation circuit. The signal goes through delay line DL701 to phase compensate for the group delay of the chroma low pass filter, then has its level adjusted with RV704. Then, it goes through the video/component switching circuit and is output at Pin 1 of CN701. The value of the Y signal output level from pedestal to white peak is adjusted to 1.2 V (for 100% input).

The R−Y signal is made by using R712 and R715 to mix the −Y signal made at Q711 and the R signal. The balance with the Y signal is finely adjusted with RV701. Then the R−Y signal selected with the color difference/RGB switch (IC702) has its bandwidth restricted to 1 MHz by FL701, has its phase compensated with Q705, then has its level adjusted with RV702. Then the same as the Y signal, it goes through the video/component switching circuit and is output at Pin 3 of CN701. The output level of the R−Y signal is 1.33 V p-p (for 100% input).

The B−Y signal is made by using R732 and R736 to mix the −Y signal made at Q711 and the B signal. The balance with the Y signal is finely adjusted with RV701. Then the B−Y signal selected with the color difference/RGB switch (IC702) has its bandwidth restricted to 1 MHz by FL702, has its phase compensated with Q717, then has its level adjusted with RV703, goes through the switch (IC701), and is output at Pin 5 of CN701. Then the same as the Y signal, it gose through the video/component switching circuit and is output at Pin 5 of CN701. The output level of the B−Y signal is 1.33 V p-p (for 100% input).

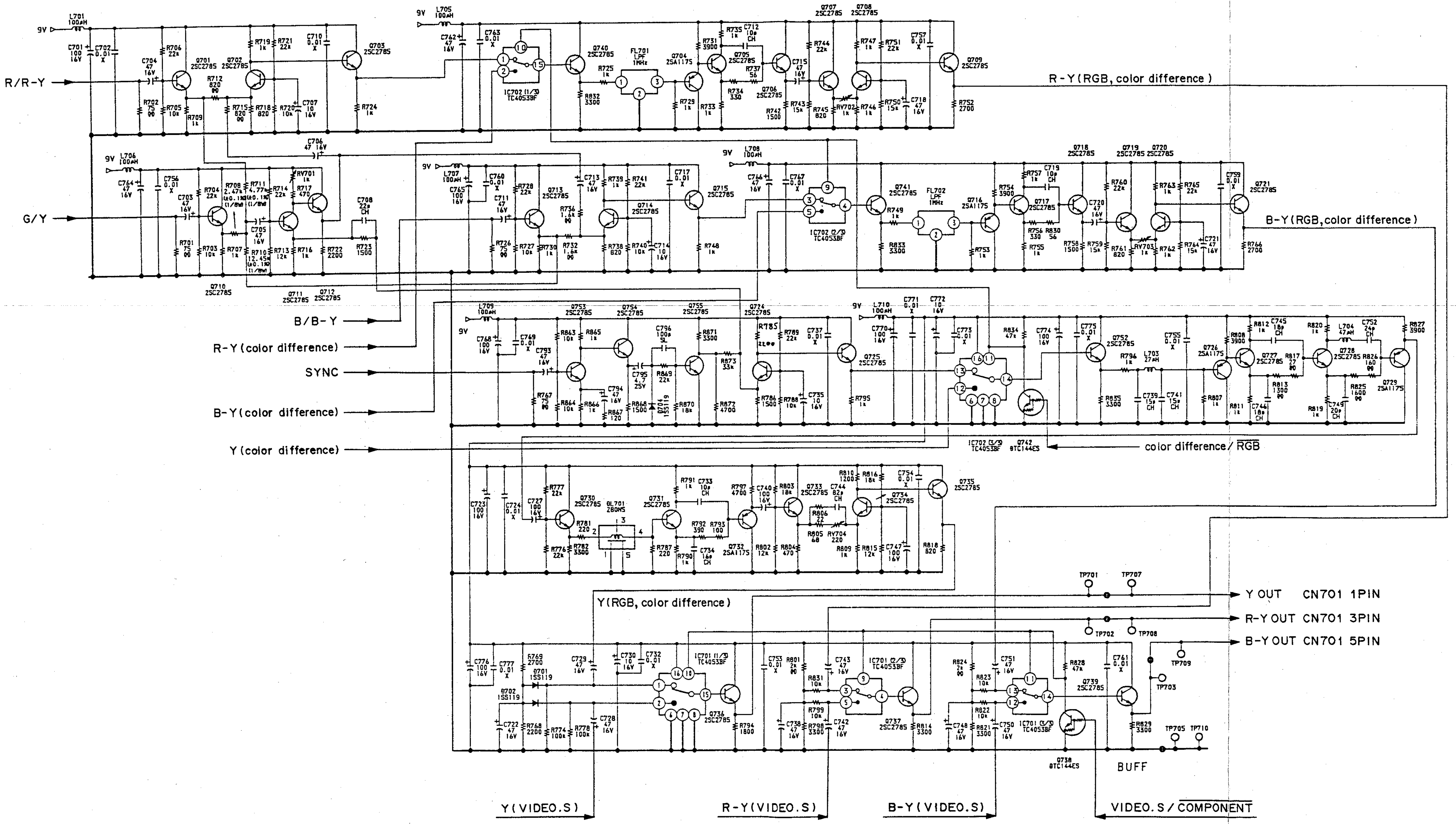

R/R-Y
G/Y
B/B-Y
R-Y (color difference)
SYNC
B-Y (color difference)
Y (color difference)
9V
R-Y (RGB, color difference)
B-Y (RGB, color difference)
IC702 (1/3) TC4053BF
IC702 (2/3) TC4053BF
IC702 (3/3) TC4053BF
Q742 DTC144ES
color difference/$\overline{\text{RGB}}$
Y (RGB, color difference)
IC701 (1/3) TC4053BF
IC701 (2/3) TC4053BF
IC701 (3/3) TC4053BF
Q738 DTC144ES
TP701
TP707
TP702
TP708
TP709
TP703
TP705
TP710
Y OUT CN701 1PIN
R-Y OUT CN701 3PIN
B-Y OUT CN701 5PIN
BUFF
Y (VIDEO.S)
R-Y (VIDEO.S)
B-Y (VIDEO.S)
VIDEO.S/$\overline{\text{COMPONENT}}$

Fig. 3-1. RGB Input Matrix Circuit

3-3. Y/COLOR DIFFERENCE INPUT CIRCUIT

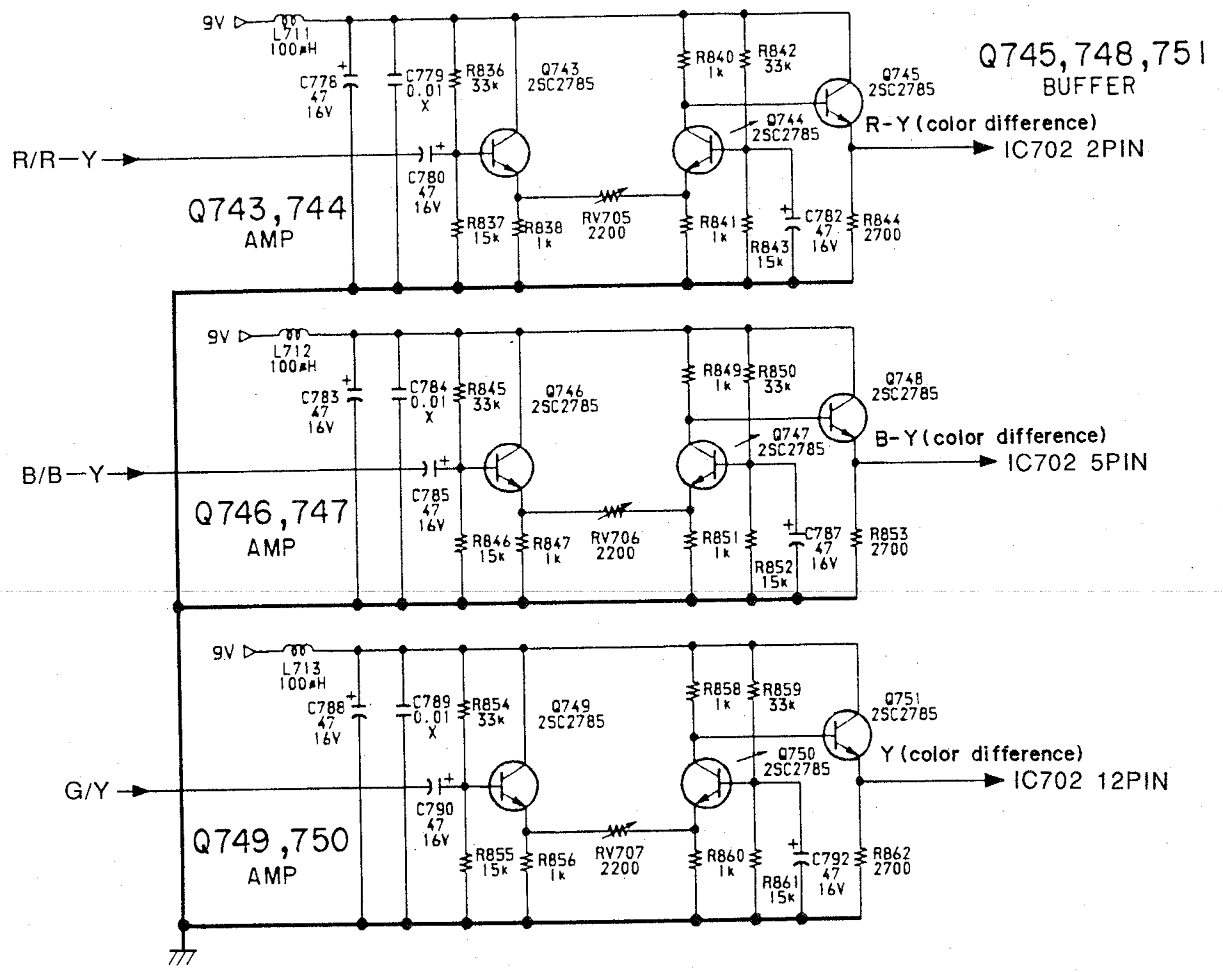

9V
L711 100μH
C776 47 16V
C779 0.01
R836 33k
Q743 2SC2785
R840 1k
R842 33k
Q745 2SC2785
Q745,748,751
BUFFER
R/R−Y
C780 47 16V
Q744 2SC2785
R−Y (color difference)
IC702 2PIN
Q743,744
AMP
R837 15k
R838 1k
RV705 2200
R841 1k
R843 15k
C782 47 16V
R844 2700
L712 100μH
C783 47 16V
C784 0.01
R845 33k
Q746 2SC2785
R849 1k
R850 33k
Q748 2SC2785
B/B−Y
C785 47 16V
Q747 2SC2785
B−Y (color difference)
IC702 5PIN
Q746,747
AMP
R846 15k
R847 1k
RV706 2200
R851 1k
R852 15k
C787 47 16V
R853 2700
L713 100μH
C788 47 16V
C789 0.01
R854 33k
Q749 2SC2785
R858 1k
R859 33k
Q751 2SC2785
G/Y
C790 47 16V
Q750 2SC2785
Y (color difference)
IC702 12PIN
Q749,750
AMP
R855 15k
R856 1k
RV707 2200
R860 1k
R861 15k
C792 47 16V
R862 2700

Fig. 3-2. Y/Color Difference Input Circuit

When the R−Y, B−Y, and Y input signals arrive, the Y/color difference input circuit amplifies the respective signal levels to a fixed level. Each signal is adjusted with its respective variable resistor to be the same level as at the output terminals of the RGB input matrix circuit already discussed.
The R−Y signal and the B−Y signal are adjusted with RV705 and RV706, respectively, so that each is 1.0 Vp-p at TP702 and TP703 when a 75% color bar is input.
The Y signal is adjusted with RV707 so that the value from its pedestal to the white peak at TP701 is 1.2 V for the signal input given above.

3-4. VIDEO INPUT Y/C SEPARATION CIRCUIT (COMB FILTER)

3-4-1. Y/C separation

The input video signal goes through buffer amp Q101 and is input to the S-Video/Video select switch (IC101 Pin 1). The selected video signal is sent to the phase compensation circuit and low-pass filter made up of Q103 to Q108.
After the level is adjusted by RV101 in the grounded-base amp made up of Q109, Q111, and Q112, the signal is amplified by the amp made up of Q301 to Q304, then the sync tip is clamped with Q305 to Q307.
The video signal with its sync tip clamped is input to the 8-bit A/D converter (at IC301 Pin 19),converted into digital signals and output from Pin 3 (LSB) through Pin 10 (MSB) of the IC. Furthermore, these signals are input to Pin 67 (MSB) through Pin 74 (LSB) of the digital comb filter IC (IC302). After the Y/C are separated,the C signal is output from pin 27 and the Y signal from Pin 38.

3-4-2. Y signal processing

The Y signal has its level adjusted by RV301 and is output from Pin 38 of IC302. Then it goes through the Q308 buffer amp and goes through the phase compensation circuit and low-pass filter made up of FL301 and Q309 to Q312 to have its sampling frequency component removed. Next, the Y signal flows to IC101 Pin 3 and IC102 Pin 13.
IC101 switches between a black-and-white signal and the S-Video input Y signal. The Y signal from IC101 goes through the buffer amp made up of Q117 and Q120, then the DL101 delay line, the Q121 to Q123 phase compensation circuit, and the Q124 to Q126 grounded-base circuit, and is input to the signal switching circuit at IC701 Pin 2. At this point, the time axis matches that of the C signal output from the chroma decoder circuit. IC102 switches with the S-Video input Y signal and inputs the result to the chroma decoder IC (IC502 Pin 27).

3-4-3. C signal processing

The C signal is output from IC302 Pin 27. Then it goes through the Q317 buffer amp and has its sampling frequency component removed in the FL302 band pass filter. Next, its delay is matched with that of the Y signal by the Q318 and Q319 equalizer, then it is input to IC101 Pin 13. Here it is switched with the S-Video input C signal and input to the chroma decoder IC (IC502 Pin 24).

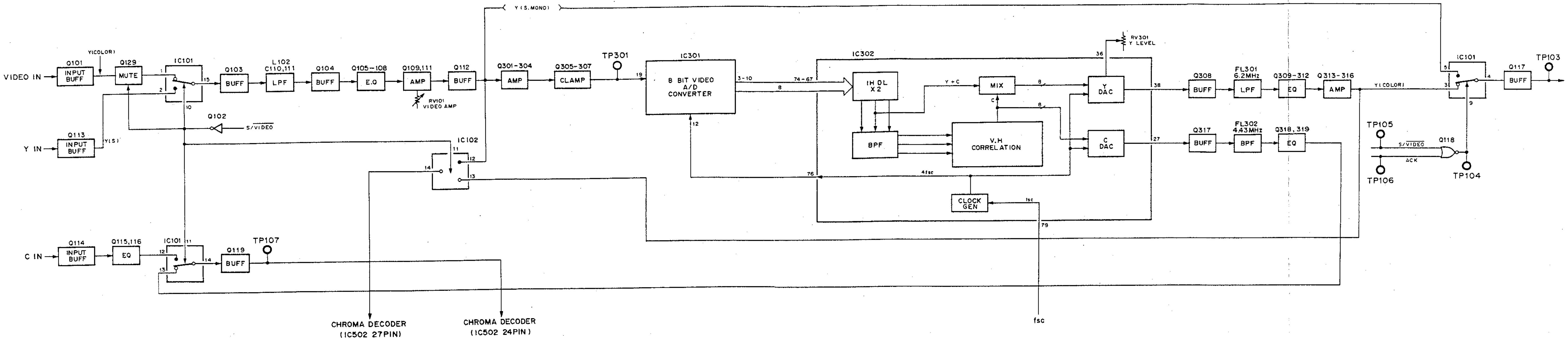

Y (S.MONO)
VIDEO IN
Q101
INPUT BUFF
Y(COLOR)
Q129
MUTE
IC101
1
2
15
10
Q103
BUFF
L102
C110,111
LPF
Q104
BUFF
Q105–108
E.Q
Q109,111
AMP
RV101
VIDEO AMP
Q112
BUFF
Q301–304
AMP
Q305–307
CLAMP
TP301
19
Q102
S/VIDEO
Q113
Y IN
INPUT BUFF
Y(S)
IC102
11
12
13
14
C IN
Q114
INPUT BUFF
Q115,116
EQ
IC101
11
12
13
14
Q119
BUFF
TP107
CHROMA DECODER
(IC502 27PIN)
CHROMA DECODER
(IC502 24PIN)
IC301
8 BIT VIDEO
A/D
CONVERTER
3-10
8
12
IC302
74-67
1H DL
X2
BPF
Y+C
MIX
C
8
8
V.H
CORRELATION
Y
DAC
C
DAC
36
RV301
Y LEVEL
38
27
76
4fsc
CLOCK GEN
fsc
79
fsc
Q308
BUFF
FL301
6.2MHz
LPF
Q309–312
EQ
Q313–316
AMP
Y(COLOR)
Q317
BUFF
FL302
4.43MHz
BPF
Q318,319
EQ
IC101
5
3
4
9
Q117
BUFF
TP103
TP105
S/VIDEO
ACK
Q118
TP106
TP104

Fig. 3-3. Video Input Y/C Separation Circuit/S-Video Input Circuit

3-5. S-VIDEO INPUT CIRCUIT

3-5-1. Y signal system

The input Y signal goes through the Q113 buffer amp and is input to the S-Video/Video switch (Pin 2 of IC101). The same as for the video input already discussed, the Y signal selected there goes through a low pass filter and phase compensation circuit. However, since this signal has already had the Y and C components separated, it is input to Pin 5 of IC101 and Pin 12 of IC102 from the emitter of Q112, the same as for the Y signal after Y/C separation. The input Y signals are switched in IC101 and IC102, then flow through the path explained in 3-4-2.

3-5-2. C signal system

The input C signal goes through the Q114 buffer amp, goes through the phase compensation circuit comprising Q128, Q115 and Q116, and is input to the S-Video/Video switch (Pin 12 of IC101). Here the C signal is switched with the video input C signal and the result input to the chroma decoder IC(Pin 24 of IC502).

3-6. CHROMA DECODER

The chroma signal input to Pin 24 of the chroma decoder IC(IC502) has the burst signal extracted with the burst flag pulse created from the Y signal input to Pin 27. The resulting chroma signal is the APC reference. The burst flag pulse position is adjusted with RV503. Also with TP503 grounded, the free-run VXO frequency is adjusted with RV504 so that the frequency at TP513 is within the range 4.433619 MHz ± 20 Hz and the level is adjusted with RV505 to be 1.0 ± 0.02 Vpp.

After the decoder operates on the current chroma signal and the 1H delayed chroma signal, it demodulates. The level of the 1H delayed chroma signal is determined by the DC voltage at TP514, which is adjusted with RV502 to be 2.3 V. The amount of the delay is adjusted with T501. This method inputs the signals at TP702 (R−Y), TP703 (B−Y), and TP701 (Y: for external reference) to the component waveform monitor and adjusts so that each brightness point is one point. (Fig. 3-4.)

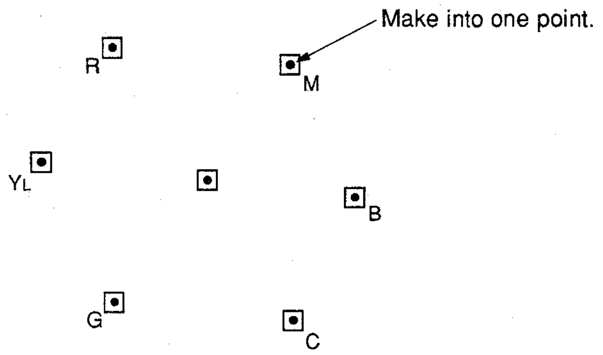


Fig. 3-4. Adjusting the 1H Delay

The output levels for the detected R−Y and B−Y signals output from IC502 Pins 16 and 17 are determined by the DC voltage at TP503, which is adjusted with RV501 to be 2.54 V.

The R−Y signal goes through the 8.8 MHz and 4.4 MHz traps made up of Q512 to Q514, is amplified to 1.33 Vpp (for 100% input) by the amp made up of Q515 to Q517, and is output from Pin 3 of CN701. In the same way, the B−Y signal goes through the traps made up of Q519 to Q522, the signal is amplified to 1.33 Vpp (for 100% input) by the amplifier comprising Q522 to Q524 and is output from Pin 5 of CN701.

The chroma decoder has the ACK operation. This circuit determines whether the mode of the input video signal is black-and-white or color. There is a circuit comprising Q507 to Q510 for controlling an external circuit using this detected voltage. This operation is adjusted with RV506 so that the voltage at TP509 is between the voltages detected at IC502 Pin 4 for color signal input and for black-and-white signal input. In this way, for color signal input, 0 V is finally output from the collector of Q510 and for black-and-white signal input, 5 V are output from the collector of Q510.

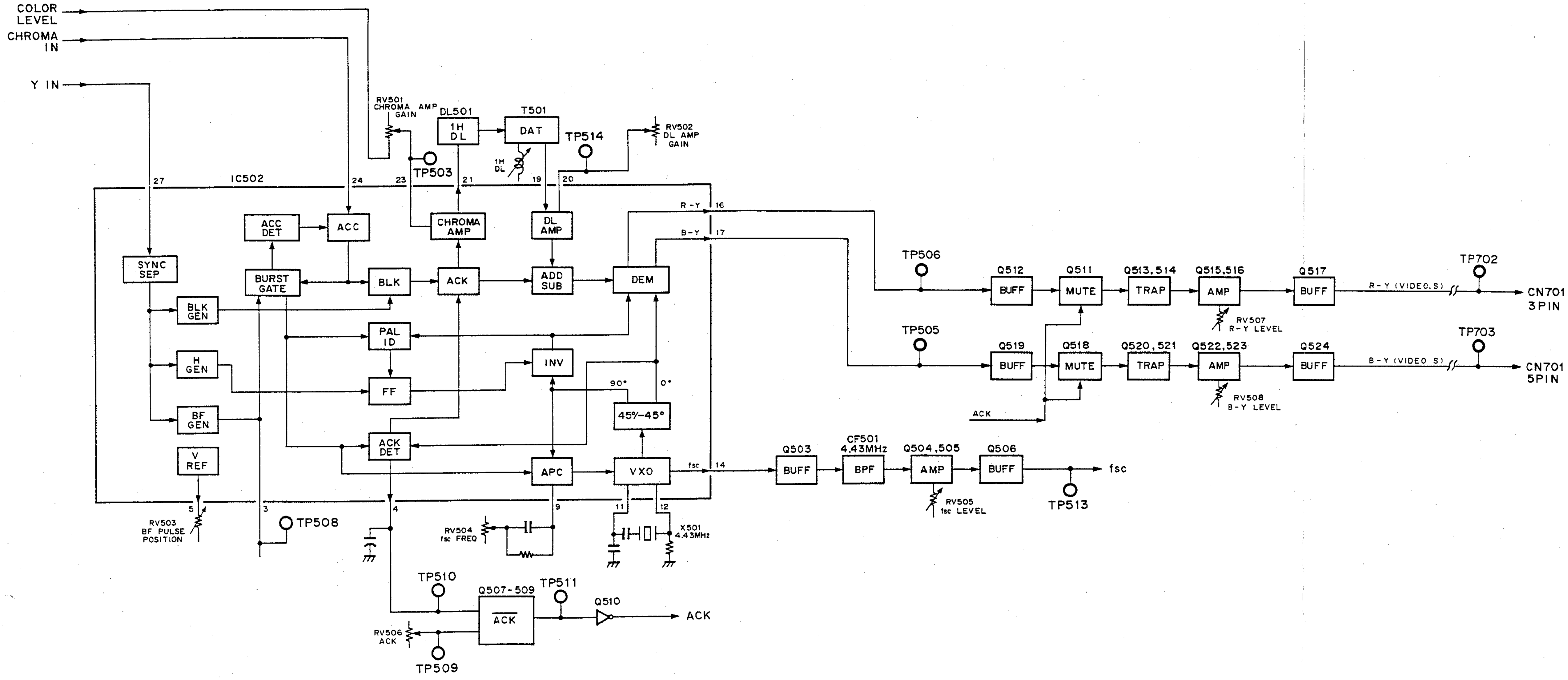

COLOR LEVEL
CHROMA IN
Y IN
RV501 CHROMA AMP GAIN
DL501
1H DL
T501
DAT
1H DL
TP514
RV502 DL AMP GAIN
TP503
IC502
27
24
23
21
19
20
R-Y
16
B-Y
17
ACC DET
ACC
CHROMA AMP
DL AMP
SYNC SEP
BURST GATE
BLK
ACK
ADD SUB
DEM
BLK GEN
PAL ID
INV
H GEN
FF
90°
0°
45°/-45°
BF GEN
ACK DET
V REF
APC
VXO
fsc
14
5
3
4
9
11
12
RV503 BF PULSE POSITION
TP508
RV504 fsc FREQ
X501 4.43MHz
TP510
Q507-509
ACK
TP511
Q510
ACK
RV506 ACK
TP509
TP506
Q512
BUFF
Q511
MUTE
Q513,514
TRAP
Q515,516
AMP
RV507 R-Y LEVEL
Q517
BUFF
R-Y (VIDEO.S)
TP702
CN701 3PIN
TP505
Q519
BUFF
Q518
MUTE
Q520,521
TRAP
Q522,523
AMP
RV508 B-Y LEVEL
Q524
BUFF
B-Y (VIDEO S)
TP703
CN701 5PIN
ACK
Q503
BUFF
CF501 4.43MHz
BPF
Q504,505
AMP
RV505 fsc LEVEL
Q506
BUFF
fsc
TP513

Fig. 3-5. Chroma De-coder Block Diagram

3-7. RELAY CIRCUIT

The MPU-F100P works so that even when the power is off, signals between the same type of input and output terminals are not cut. For example, if there is video input, these signals are output at the video output, regardless of whether the power switch is on or off. However, for video input, the S-Video output is cut off when the power is switched off.
The reason is that the relays (RY901 to RY908) on the IV-39 board send the input signal to the internal circuits when the power is on, but send them directly to the output terminals when the power is off. However, the reference and video through output signals are only output when the power is on. The terminating resistance for no other signals than the reference and video signals are also switched on/off at the same time by the relays.
Fig. 3-6. is a diagram of the relay block.

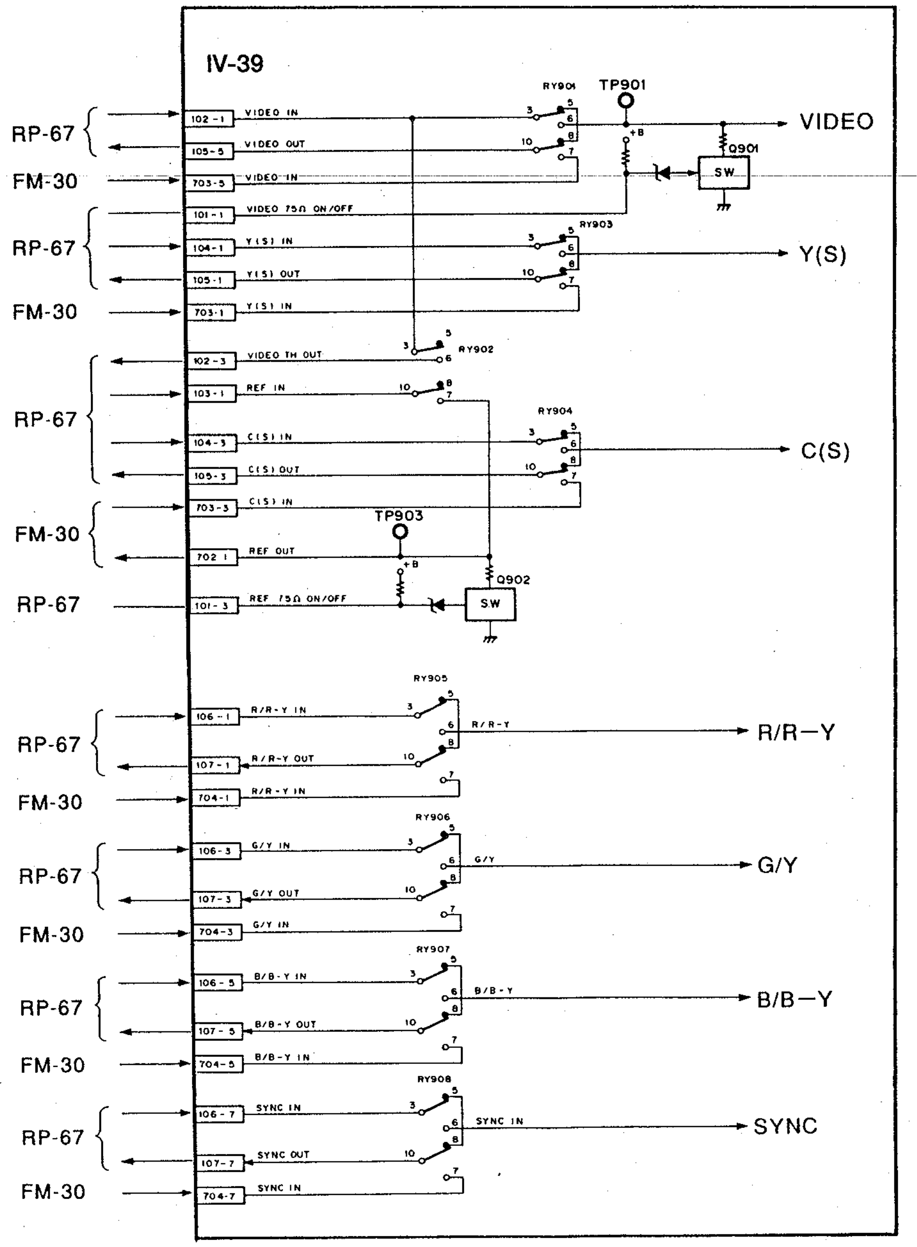

IV-39
RP-67
FM-30
RP-67
FM-30
RP-67
FM-30
RP-67
RP-67
FM-30
RP-67
FM-30
RP-67
FM-30
RP-67
FM-30
102-1 VIDEO IN
105-5 VIDEO OUT
703-5 VIDEO IN
101-1 VIDEO 75Ω ON/OFF
104-1 Y(S) IN
105-1 Y(S) OUT
703-1 Y(S) IN
102-3 VIDEO TH OUT
103-1 REF IN
104-3 C(S) IN
105-3 C(S) OUT
703-3 C(S) IN
702-1 REF OUT
101-3 REF 75Ω ON/OFF
106-1 R/R-Y IN
107-1 R/R-Y OUT
704-1 R/R-Y IN
106-3 G/Y IN
107-3 G/Y OUT
704-3 G/Y IN
106-5 B/B-Y IN
107-5 B/B-Y OUT
704-5 B/B-Y IN
106-7 SYNC IN
107-7 SYNC OUT
704-7 SYNC IN
RY901
TP901
+B
Q901
SW
RY902
RY903
RY904
TP903
Q902
RY905
RY906
RY907
RY908
R/R-Y
G/Y
B/B-Y
SYNC IN
VIDEO
Y(S)
C(S)
R/R−Y
G/Y
B/B−Y
SYNC

Fig. 3-6. Relay Block

4. FM-30 BOARD

4-1. OUTLINE

FM-30 board A/D converts Y/R−Y/B−Y signals from IV-39 board and inputs them to frame memory. These signals are then D/A converted. The signals then pass through circuits such as the RGB matrix, encoder, Y/C mix to be output as RGB, Y/R−Y/B−Y, S-video and composite video signals.
Also, TBC effect is possible by writing in memory without jitter by detecting jitter from input Y signal and altering write clock.
The FM-30 board consists of the following circuits.

- Clamp Circuit

  Y/R−Y/B−Y signals are input to the FM-30 board. Each signal is clamped before being A/D converted so that output does not DC fluctuation when the input signal fluctuates.
  R−Y, B−Y are hard clamped only.
  After being hard clamped, Y signal is soft clamped using pedestal clamp error voltage feed back from the memory system. This fixes the black level so that it is always stable against the pedestal level.

- A/D Conversion Circuit

  Clamped Y/R−Y/B−Y signals are A/D converted by 910fh clock (14.21875 MHz). The clock used here is PLL locked to input Y signal and therefore, is written into memory by clock following jitter and written into memory without jitter.

- Write VCO Circuit and Various Timing Pulse Generating Circuit

  A circuit to generate clock for A/D conversion and to write data in memory. The Y signal input to the IC is synchronously separated. After that, the PLL locked 910fh (14.21875 MHz) applied to the separated SYNC is oscillated.
  Timing pulse for H pulse, VD pulse and AFH pulse are generated at the same time.

- Read VCO Circuit and Various Timing Pulse Generating Circuit

  Circuit to generate clock for reading data out of memory.
  Circuit construction is the same as write circuit.

- Memory Control Circuit

  This block generates pulse to control write timing for 6 field memories. 6 field memories are divided in half into ODD and EVEN (3 each) fields, and input video signals are written according to their respective field, whether ODD or EVEN.

- Memory Circuit

  6 field memories are divided into groups of three for ODD field and EVEN field. Of the 3 field memories, 2 are for Y signal and 1 is for chroma signal.

  Y/R—Y/B—Y are each written in 8 bits.

- RGB Matrix Circuit

  This circuit returns the D/A converted Y/R—Y/B—Y signals to their original RGB form.

  The circuit is constructed of resistance matrix.

- ENCODER Circuit

  The R—Y signal and the B—Y signal converted from digital to analog are modulated with the subcarrier(4.43361875 MHz), then mixed with the burst signal.

- SETUP Supplementary Circuit

  Circuit to add SETUP to input video signal.

- SYNC Supplementary Circuit

  Circuit to replace synchronous signal allowing a noiseless synchronous signal to be output from here.

- GEN LOCK Circuit

  Circuit to apply GEN LOCK to Ref VIDEO input from outside.

  Sub carrier and SYNC may be synchronized to Ref VIDEO.

  The allows synchronization with other units.

4-2. CLAMP CIRCUIT

R−Y, B−Y signals input from IV-39 board are each hard clamped at Q101 and Q103. Timing of clamp pulse used here is decided by BFP (burst flag pulse) with AFC applied to the input signal, and pulse width is decided by IC211 mono-multi.

The clamped R−Y signal and B−Y signal pass through each buffer of Q109, Q102 (R−Y signal side) and Q110, Q104 (B−Y signal side) and then proceed to the A/D converter circuit. Clamp voltage is set so that pedestal level is [7FH].

Y signal, similar to the color difference signal, is hard clamped at Q105 and then soft clamped at Q107.

Feedback DC voltage used here is generated at IC206. This DC viltage is output to pin 40 through pin 43 of IC206 as 4 bit digital data so that pedestal level data of Y signal input to IC206 is [CH8]. This is then D/A converted to DC voltage by resistance rudder pass through the low pass filter at Pins 54 and 55 of IC206, and mixed as Q107 bias voltage.

4-3. A/D CONVERSION CIRCUIT

Y/R−Y/B−Y signals with DC level fixed by clamp circuit is input to pin 19 of the A/D converter IC (IC103, IC101, IC102) by DC coupling. R−Y/B−Y signals are switched over alternately at 910fh cycle by IC201 and IC202 data buffer, are digital encoded and then output to next memory control circuit. Switch-over pulse used here is generated at IC203, IC204 and IC205.

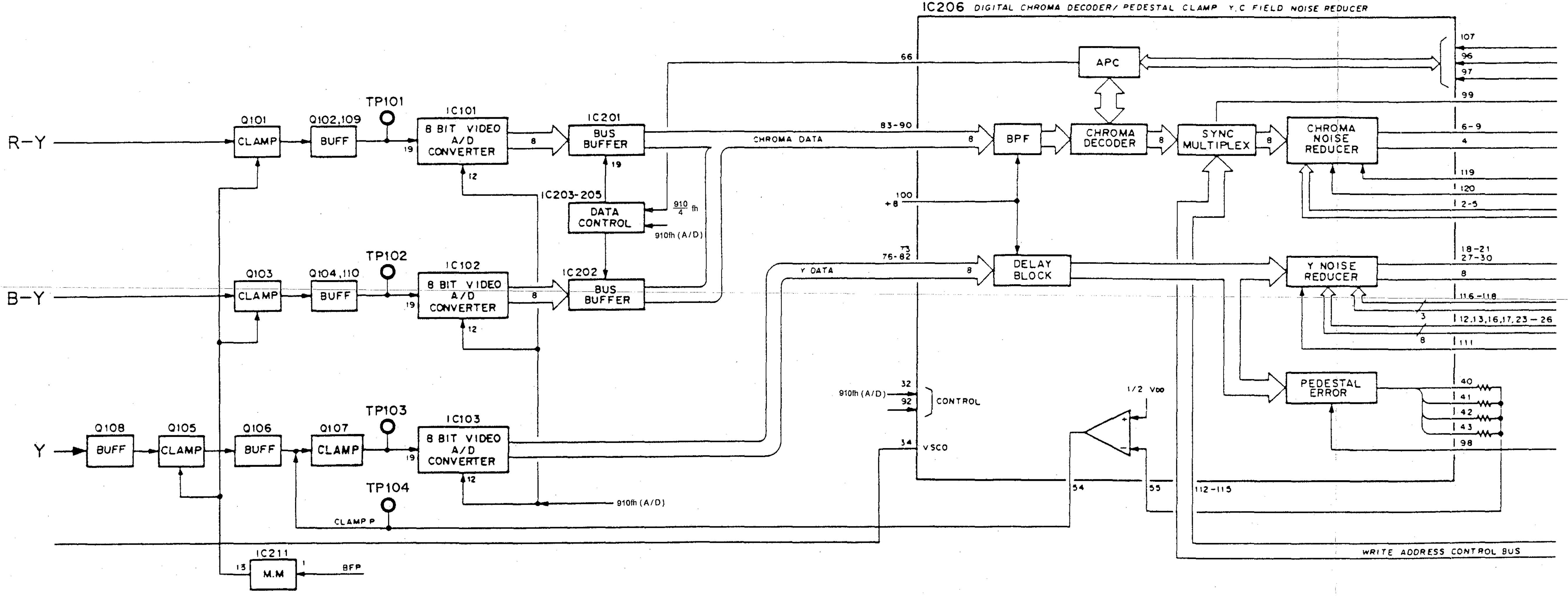

R−Y
B−Y
Y
Q101
CLAMP
Q102,109
BUFF
TP101
IC101
8 BIT VIDEO A/D CONVERTER
19
12
8
IC201
BUS BUFFER
19
Q103
CLAMP
Q104,110
BUFF
TP102
IC102
8 BIT VIDEO A/D CONVERTER
IC203-205
DATA CONTROL
910/4 fh
910fh (A/D)
IC202
BUS BUFFER
Q108
BUFF
Q105
CLAMP
Q106
BUFF
Q107
CLAMP
TP103
IC103
8 BIT VIDEO A/D CONVERTER
TP104
910fh (A/D)
CLAMP P
IC211
M.M
13
1
BFP
CHROMA DATA
Y DATA
IC206 DIGITAL CHROMA DECODER/ PEDESTAL CLAMP Y.C FIELD NOISE REDUCER
66
83-90
100
+8
73
76-82
APC
BPF
CHROMA DECODER
SYNC MULTIPLEX
CHROMA NOISE REDUCER
DELAY BLOCK
Y NOISE REDUCER
PEDESTAL ERROR
107
96
97
99
6-9
4
119
120
2-5
18-21
27-30
116-118
3
12,13,16,17,23 − 26
111
40
41
42
43
98
32
92
CONTROL
34
VSCO
1/2 VDD
54
55
112-115
WRITE ADDRESS CONTROL BUS

Fig. 4-1. Clamp & A/D Comversion Circuit Block Diagram

4-4. WRITE VCO CIRCUIT AND VARIOUS TIMING PULSE GENERATING CIRCUITS

The Y signal that is output from the IV-39 board is input to the clamp circuit and also to pin 5 and pin 9 of IC208 (corresponds to MB87647, CXD1229). Video signal input from pin 5 is SYNC SEPARATED and becomes H SYNC for clamping. Video signal input from pin 9 is hard clamped by H SYNC and DC level is fixed. The clamp level of video signal input to pin 5 and pin 9, and slice level at SYNC SEPARATION are each added to pin 3, pin 4 and pin 7, pin 8 by resistive division. Created like this, C SYNC is phase compared with 1/910 of VCO (910fh) constructed of pin 15 and pin 16, and forms PLL loop.

The phase comparator consists of a main loop and a sub loop. The main loop forms LPF with an active filter, and the sub-loop forms LPF with a passive filter. The erroneous voltage generated at the phase comparator is input to the varicap (D201). VCO is adjusted at CV201 and adjusted so that TP202 voltage is about 2.5 V.

IC208 also outputs the following signals.

VD (pin 26) : Pulse which is SYNC SEPARATED from input video and is used as reset pulse for writing counter. Connected to IC207.
AFH (pin 27) : HD pulse with AFC applied made by dividing clock generated at VCO. Used as reset pulse for writing data in memory. Connected to IC206, IC207. AFC phase can be varied by pin 34, pin 35 of IC208 and RV203. Input image position is adjusted at RV203.
YHD (pin 28) : Timing output for pedestal clamping. Connected to IC206.
CHD (pin 29) : Timing output for burst detection. Connected to IC206.
CSYN (pin 48) : Synchronous separation output.
MCKO (pin 17) : 910fh output terminal. Clock synchronous to input signal. Used as clock for A/D conversion and writing data in memory.

4-5. READ VCO CIRCUIT AND VARIOUS TIMING PULSE GENERATING CIRCUITS

This circuit generates various timing pulses for reading data out of memory. The construction is about the same as the write circuit. Input signal is C SYNC generated from the GEN LOCK circuit. Various timing pulses are generated from this signal in the same way as the write circuit.

VD (pin 26) : H counter reset pulse for reading memory.
AFH (pin 27) : Clock counter reset pulse for reading memory.
MCKO (pin 17) :910fh output. Used as clock for D/A conversion and reading memory.

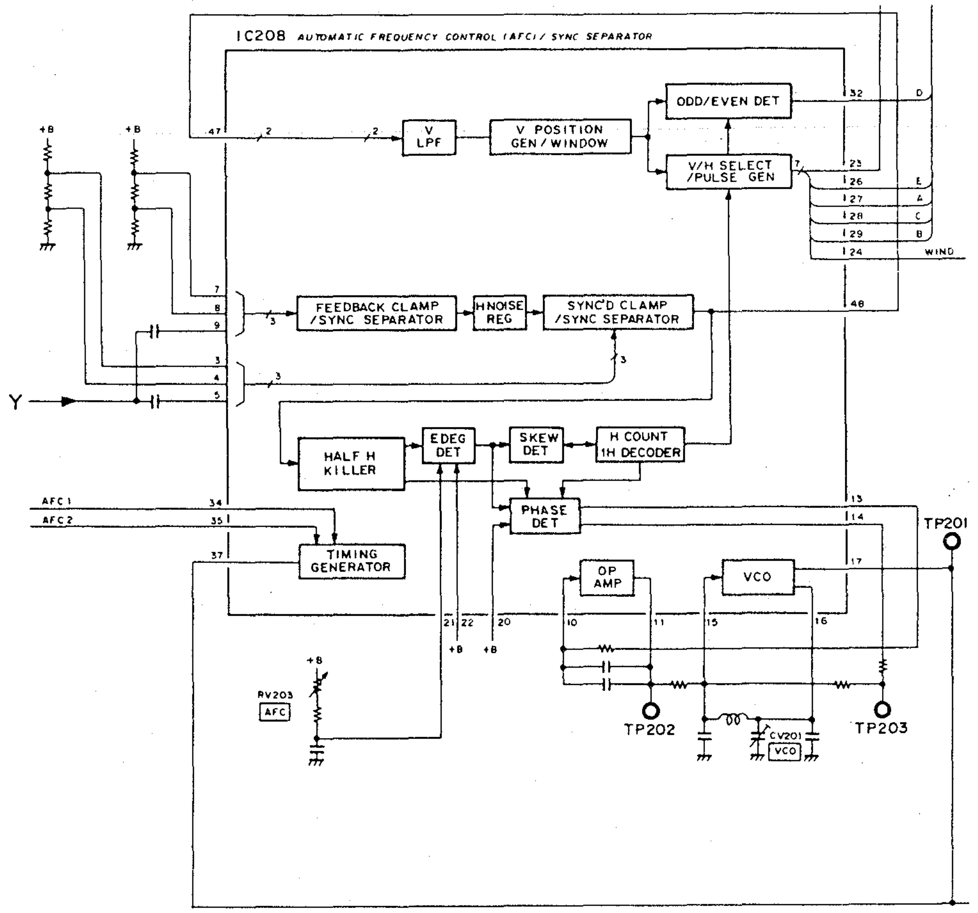

IC208 AUTOMATIC FREQUENCY CONTROL (AFC) / SYNC SEPARATOR
+B
+B
Y
AFC 1
AFC 2
V LPF
V POSITION GEN / WINDOW
ODD/EVEN DET
V/H SELECT /PULSE GEN
FEEDBACK CLAMP /SYNC SEPARATOR
H NOISE REG
SYNC'D CLAMP /SYNC SEPARATOR
HALF H KILLER
EDEG DET
SKEW DET
H COUNT 1H DECODER
PHASE DET
TIMING GENERATOR
OP AMP
VCO
RV203
AFC
CV201
VCO
TP201
TP202
TP203
WIND
D
E
A
C
B
47
32
23
26
27
28
29
24
48
7
8
9
3
4
5
34
35
37
13
14
17
21
22
20
10
11
15
16

Fig. 4-2. AFC/SYNC Separator Block Diagram (IC208)

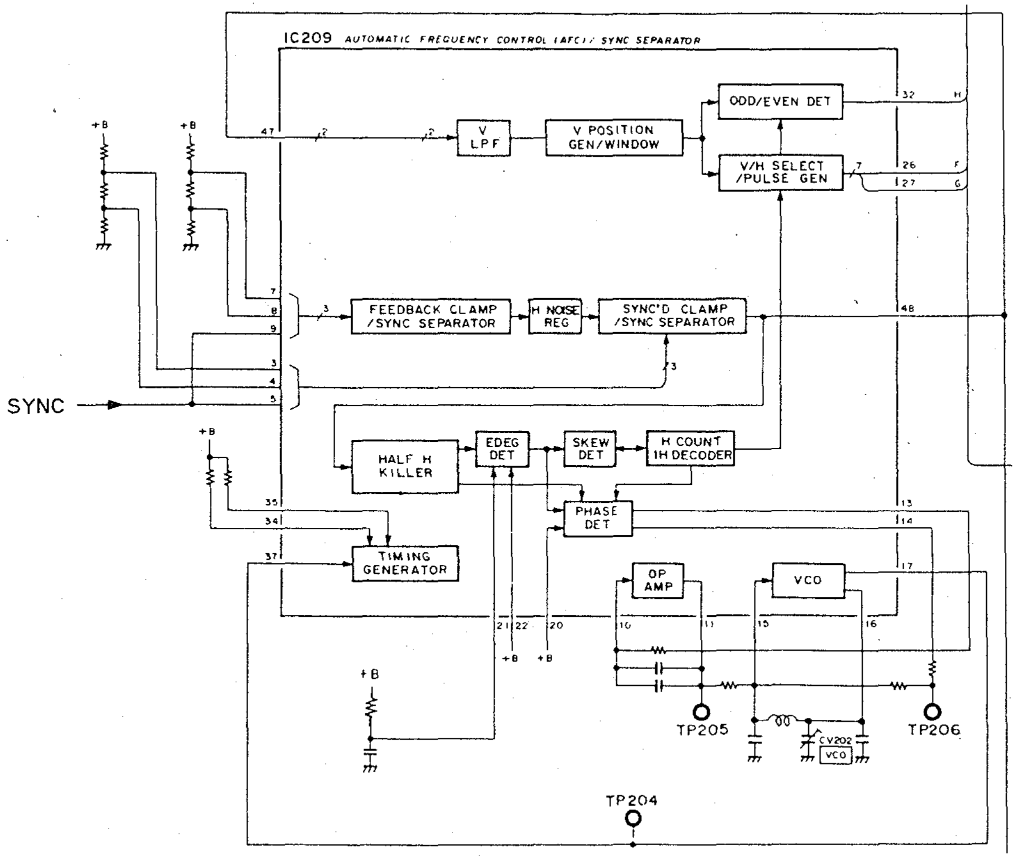

IC209 AUTOMATIC FREQUENCY CONTROL (AFC) / SYNC SEPARATOR
+B
+B
SYNC
V LPF
V POSITION GEN/WINDOW
ODD/EVEN DET
V/H SELECT /PULSE GEN
FEEDBACK CLAMP /SYNC SEPARATOR
H NOISE REG
SYNC'D CLAMP /SYNC SEPARATOR
HALF H KILLER
EDEG DET
SKEW DET
H COUNT 1H DECODER
PHASE DET
TIMING GENERATOR
OP AMP
VCO
CV202
VCO
TP204
TP205
TP206
H
F
G
47
32
26
27
48
7
8
9
3
4
5
35
34
37
13
14
17
21
22
20
10
11
15
16

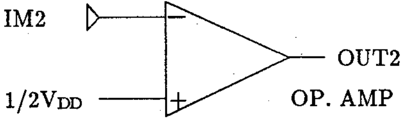
Fig. 4-3. AFC/SYNC Separator Block Diagram (IC209)

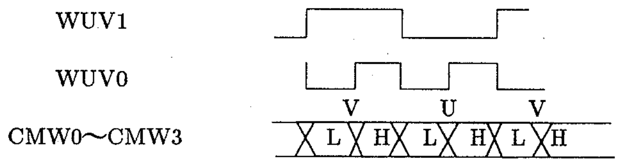
4-6. MEMORY CONTROL CIRCUIT

4-6-1. MAIN BLOCK

Main block is constructed of IC206 (CXD1226), IC207 (MB87448A : equivalent to CXD1228), IC210 (CXD1227) and logic IC. IC206 functions are chroma decoder, pedestal clamp error computing circuit, field noise reducer and D.O.C. (not used here). IC210 functions are vertical enhancer (Y only), chroma encoder and D.O.C.(not used here). IC207 functions are address control of 3 port VRAM (CXK1206M : Field memory IC), control of CXD1226 and CXD1227, and micro computer interface. The following is a chart showing the terminal functions of each IC206, IC207 and IC210.

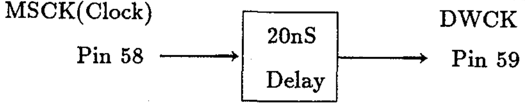
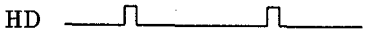
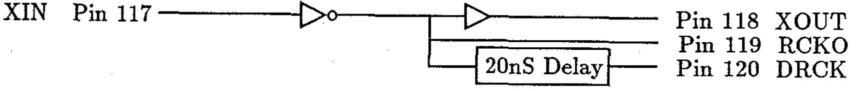
IC206(CXD1226)

Pin No.	Pin Name	Connection	Description
1	Vss		GND
2-5	CSR0-CSR3	CXK1206M	Input terminal for reading data from memory. Chroma line.
6-9	CMW0-CMW3	CXK1206M	Output terminal to memory. Outputs synchronouslyto WUV1. Chroma line.
12,13	YSR0,1	CXK1206M	Input terminal for data from memory. Y line(YSR0 through YSR7 8bit structure)
14	VDD		+5V
15	Vss		GND
16,17	YSR2,3	CXK1206M	Input terminal for data from memory. Y line.
18-21	YMW0-YMW3	CXK1206M	Data output terminal to memory. Y line.(YMW0 through YMW7 8bit structure)
23-26	YSR4-YSR7	CXK1206M	Input terminal for data from memory. Y line.
27-30	YMW4-YMW7	CXK1206M	Data output terminal to memory. Y line
31	Vss		GND
32	CMCK		Chroma line processing clock input terminal.
33	DOP		Input terminal for drop out compensation timing signal. (Not used)
34 35 36	USC0 JPI0 JPI1		Option data input terminal. Written in memory synchronously to WCDT timing and output from CXD1227. In this unit, pin 34 is used as ACK.
37	YSYS		Delay adjustment for Y line.
38	PHEN		Chroma APC line control input (BPE0 through BPE3). Holds H→Normal, L→APC error.
40-43	PED0-PED3		Pedestal clamp error output terminal.
44	VDD		+5V
45	Vss		GND
53	AG		Analog system GND
54 55	OUT2 IM2		
61	Vss		GND
66	FSC		Output terminal for CMCK input divided in four.
71 72	CS0 CS1		Selects chroma signal processing mode.
73	WY7	IC103	Y signal input terminal along with WY0 through WY6. When WY0 is LSB and SADM is L input becomes effective.
74	VDD		+5V
75	Vss		GND
76-82	WY6-WY0	IC103	Same as pin 73.
83-90	WCY7-WCY0	IC201,IC202	Input terminal for chroma signal. Chroma signal input when SADM is L. Composite signal input at H.(SADM is L with this unit)
91	Vss		GND
92	YMCK	MB87647	Input terminal for memory control system processing clock. Y line.
93	PINV		Reverses polarity of pedestal clamp error output(PED0 through PED3). Normally it is L.

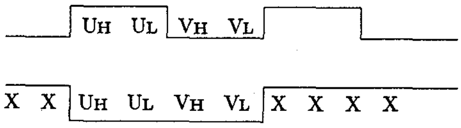
Pin No.	Pin Name	Connection	Description
94	NRFD		Controls LPF for Y line NR field difference data output. H→LPF ON, L→LPF OFF
96	AHD	MB87647	Renewal timing of APC error. When input is fixed, APC operation stops.
97	CHD	MB87647	Responds to burst flag pulse.
98	YHD	MB87647	Responds to pedestal clamp pulse.
99	WEVN	MB87647	Input terminal for O/E decision signal. Written in memory synchronously to WCDT timing and read from CXD1227 REVN.
101	SADM		H when used as composite. L when used as Y/C separate. Used as L in this unit.
102	CLR		Direct clear of whole system. Clears at L. Power ON Reset not necessary.
104	V_{DD}		+5V
105	V_{SS}		GND
107	ACK	MB87448A	L when color, H when B/W.
108	YDEL		Y line delay adjustment. 560nS delay is added to Y line when H.
111	FNR	MB87448A	NR ON/OFF. H→ON, L→OFF
112	WVMT	MB87448A	Both Y/C are muted at H.
113	WCDT	MB87448A	Write timing signal for chroma signal and option data.
114	WUV0	MB87448A	 WUV1 WUV0 V U V CMW0〜CMW3 L H L H L H
115	WUV1	MB87448A	
116	YEW0	MB87448A	Y line processing mode.
117	YEW1	MB87448A	
118	YEW2	MB87448A	
119	CEV0	MB87448A	Selects chroma line NR.
120	CEV1	MB87448A	

IC207 (MB87448A)

Pin No.	Pin Name	Connection	Description
1	V_{SS}		GND
2	RCKI		Clock input of read line block.
3	REVN	CXD1227	Input O/E data on memory.
4,5	RUV0,RUV1	CXD1227	Timing control of U, V.
6	RCDT	CXD1227	Reading timing of user code.
7	BDR	CXD1227	Border timing.
8	RVMT	CXD1227	Read signal muting.
9,10	BNS0,BNS1	CXD1227	Solarization control.
11-13	HBD0-HBD2	CXD1227	Specifies border color.
14	V_{DD}		+5V
15	V_{SS}		GND
16	HBD3	CXD1227	Specifies border color.
17-19	HPR0-HPR2	CXD1227	Selects line delay feature function
20	YTIM	CXD1227	Y timing control
22	BDL	CXD1227	Border brightness level
23	PALP	CXD1227	Specifies color ID at PAL mode
24	HCL2	CXK1206M	CXK1206M timing control (Read system)
25	YINC	CXK1206M	
26	VCL2	CXK1206M	
27	CINC	CXK1206M	
28	MYCK	CXK1206M	
29	MCCK	CXK1206M	
.31	V_{SS}		GND
32	HCL0	CXK1206M	CXK1206M timing control (Write system) (Pin 35 controls CXK1206M timing in the end)
33	INC0	CXK1206M	
34	VCL0	CXK1206M	
35	XMWE		

Pin No.	Pin Name	Connection	Description
36-39	PSA3-PSA0	CXK1206M	
40	VCL1	CXK1206M	CXK1206M timing control (synchronous reading report).
41	INC1	CXK1206M	
42	HCL1	CXK1206M	
43	CEV1	CXD1226	Sets chroma NR coefficient.
44	V_{DD}		+5V
45	V_{SS}		GND
46	CEV0	CXD1226	Same as pin 43.
47-49	YEV2-YEV0	CXD1226	Sets Y NR, etc., coefficient.
50,51	WUV1,WUV0	CXD1226	Timing control of write system U, V
52	WCDT	CXD1226	User code writing timing
53	WVMT	CXD1226	Write signal muting
54	FNR	CXD1226	Controls ON/OFF of NR
55	ACK	CXD1226	H : B/W, L : Color mode
58	MSCK		
59	DWCK		
60	WCKI		Write system clock
61	V_{SS}		GND
62	WSYS		Write system function H : NTSC, L : PAL
63	EVMT		Outside muting control
64	XWE		Memory write enable
66	TDS		Test monitor pin. Normally L
67	TSH		
68	TSV		
70	WEVN	MB87647	Write system O/E decision input
71	AFH	MB87647	HD input (after AFC)
72	VD	MB87647	VD input
73	ESYN	MB87647	C SYNC input at outside synchronous mode 
74	V_{DD}		+5V
75	V_{SS}		GND
76	EEVN	MB87647	O/E decision input at outside synchronous mode
77	EAFH	MB87647	HD input at outside synchronous mode
78	EVD	MB87647	VD input at outside synchronous mode
79	EPVD		Target VD input at omnibus mode. Normally VD input.
91	V_{SS}		GND
97	SDI		Micro computer interface. Serial data
98	SCK		Micro computer interface. Transmission clock
99	XCE		Micro computer interface. Chip enable
104	V_{DD}		+5V
105	V_{SS}		GND
106	XCLR	Micro computer	Direct clear of all blocks
107	RSYS		Sets read system mode (including SYNC GEN) H→NTSC, L→PAL
108	EPAL		Inputs PAL color ID at outside synchronous mode
109	ADC		Chroma read out control H : 1 line leading Y, L : Same timing as Y
111	TRV		Test terminal. Normally L.
112	TRH		
113	WIND	MB87647	Comparison input for V-PLL.
117	XIN		 XIN Pin 117 Pin 118 XOUT Pin 119 RCKO Pin 120 DRCK 20nS Delay
118	XOUT		
119	RCKO		
120	DRCK		

IC210(CXD1227)

Pin No.	Pin Name	Connection	Description
1	VST0		Test terminal. Normally L.
2	V_{SS}		GND
3	VST1		Same as pin 1.
4-11	RC0-RC7	MB40778PF	Chroma D/A output. Connected to D/A converter.
12	V_{SS}		GND
13-20	YMR7-YMR0	CXK1206M	Y data input
21,22	CMR3,CMR2	CXK1206M	Chroma data input
23	V_{SS}		GND
24,25	CMR1,CMR0	CXK1206M	Chroma data input
30	RFSC		fsc output
31,32	CS0,CS1		Chroma select input
33	V_{DD}		+5V
34	SDAM		Select D/A mode
35	PALP	MB87448A	PAL phase control input
36	OFSB		Off-set binary mode
37,38	BDL7,BDL6	MB87448A (pin 38)	Border level (Y) input
39	RSYC		SYNC input. Replace data to SYNC level. (Not used with this unit)
40	YTIM	MB87448A	Pre-holds Y data. Used at MOSAIC.
41	HPR2	MB87448A	H process. Specifies mode for line computation (Y only).
42	V_{SS}		GND
44,45	HPR1,HPR0	MB87448A	Same as pin 41.
46,47	HBD3,HBD2	MB87448A	V axis border level input.
48,49	HBD1,HBD0	MB87448A	U axis border level input.
50,51	BNS1,BNS0	MB87448A	Bit count of solarization.
52	V_{SS}		GND
53	YCKI	MB87448A	Clock input.
54	RVMT		Video mute at H
55	BDR	MB87448A	Replaces border, Y/C level with border setting value at H.
56	YCFR		Y/C Framing ON/OFF. H→ON
57	RCDT	MB87448A	Framing code timing input
58,59	RVU1,RVU0	MB87448A	U/V timing input  U_H U_L V_H V_L X X U_H U_L V_H V_L X X X X
60	REVN	MB87448A	EVEN/ODD field monitor output
61	CCKI		Chroma clock (4fsc) input
62	CCKO		Chroma clock oscillator output
63	V_{SS}		GND
64	XOUT		Oscillator connecting terminal for chroma clock oscillator.
65	XIN		
66	USC0		User code
67	CLRI		Clear input (Normally H)
68	PCOM		Phase comparator output
69	CTLZ		Phase comparator output control input
70	FSIG		Phase comparator input (signal input)
71	FREF		Phase comparator input (reference signal input)
72	RY0		Y-D/A output
73	V_{DD}		+5V
74-80	RY1-RY7		Y-D/A output

4-6-2. Other blocks

These blocks comprise the block that generates the pulses for writing data into memory and the block that generates the pulses for reading out data from memory.

The circuit on the writing side is compose as follows. The data freeze timing is controlled by IC212 and IC214. IC213 and IC215 divides the EVEN side or the ODD side when writing the data to the memory. IC235 and IC240 control the auto freezing. When there is no signal, IC243 and IC244 generate false VD signals. Finally, IC211 and IC242 detects whether the input video signals are input correctly according to the rules (the series of EVEN/ODD signal). The $\overline{\text{XMWE}}$ signal output from Pin 35 of IC207 goes through these circuits, then is output to memory from Pin 6 of IC235 as the ODD side $\overline{\text{WE}}$ signal and from Pin 8 as the EVEN side $\overline{\text{WE}}$ signal.

In the reading circuits, IC217 and 230 control the read out frame for freezing and IC227, 233 and 234 detect the no signal state and judge the final field. The WEVN signal output from Pin 32 of IC209 goes through these circuits, then is output to memory from Pin 8 of IC217 as the ODD side $\overline{\text{OE}}$ signal and from Pin 10 as the EVEN side $\overline{\text{OE}}$ signal.

In addition, the circuit comprising IC228 and 229 determines the blanking width. The blanking width is adjusted with RV202.

4-7. MEMORY CIRCUITS

The memory circuits comprise the six field memory ICs IC218 to IC223. All ICs use a CXK1206M. And this IC is composed of 3-port (input, output and NR).

IC218 is the C system 1, 3 field, IC219 is the Y system 1, 3 field upper 4 bits, IC220 is the Y system 1, 3 field lower 4 bits, IC221 is the C system 2,4 field, IC222 is the Y system 2, 4 field upper 4 bits, and IC223 is the Y system 2, 4 field lower 4 bits.

When writing 1 data (8 bit) to the memory, the signal of the chroma system is divided twice to 4 bits each at IC206. When reading the signal from the memory, they are then divided twice to 4 bits each at IC210 after which they are read. After this they are output to the D/A converter as 1 (8 bit) data.

4-7-1. Memory writing

- Y system

The digital Y signals output from Pins 18 to 21 and 27 to 30 of IC206 are input to Pins 24 to 27 of IC219 and IC220 (1, 3 field side) and Pins 24 to 27 of IC222 and IC223 (2, 4 field side). The input signals are controlled by inputting the signals output from the memory control section to Pins 13 to 17. The clock at Pin 17 is the 910fh clock output from Pin 17 of IC208 (MB87647).

- Chroma system

The digital chroma signals output from Pins 6 to 9 of IC206 (CXD1226) are input to Pins 24 to 27 of IC218 (1, 3 field side) and Pins 24 to 27 of IC221 (2, 4 field side). The input signals are con trolled in the same manner as for the Y system.

4-7-2. Memory reading

- Y system

The field memory ICs have two read ports, one for normal reading and one for reading with noise reduction.

Normal read uses Pins 4 to 12 of the ICs. Y signal data is output from Pins 5 to 8 of IC219 and IC220 (1, 3 field side) and Pins 5 to 8 of IC222 and IC223 (2, 4 field side) and input to Pins 13 to 20 of IC210 in the memory control section. The output signals are controlled by inputting the signals from the memory control section to Pins 4 and 9 to 12. The clock at Pin 4 uses the clock output from Pin 28 of IC207 (Memory Control Section).

This clock is synchronized with the GEN LOCK signals.

NR read out uses Pins 28 to 36 of the ICs. Y signal data is output from Pins 32 to 35 of IC219 and IC220 (1, 3 field side) and Pins 32 to 35 of IC222 and IC223 (2, 4 field side) and input to Pins 12, 13, 16, 17 and 23 to 26 of IC206 (Memory Control Section).

The output signals are controlled by inputting signals from the memory control section to Pins 28 to 30 and 36. The clock at Pin 36 uses the clock output from Pin 8 of IC229 (Memory Control Section). This clock is synchronized with the input video signals. The previous frame picture data read in by IC206 is mixed with the input video signals and used for noise reduction, lap dissolve, etc.

- Chroma system

Chroma system read out is exactly the same as for the Y system, but the destinations for the normal read signals and NR read signals are different. Normal read signals are input to Pins 21, 22, 24 and 25 of IC210 and NR read signals are input to Pins 2 to 5 of IC206.

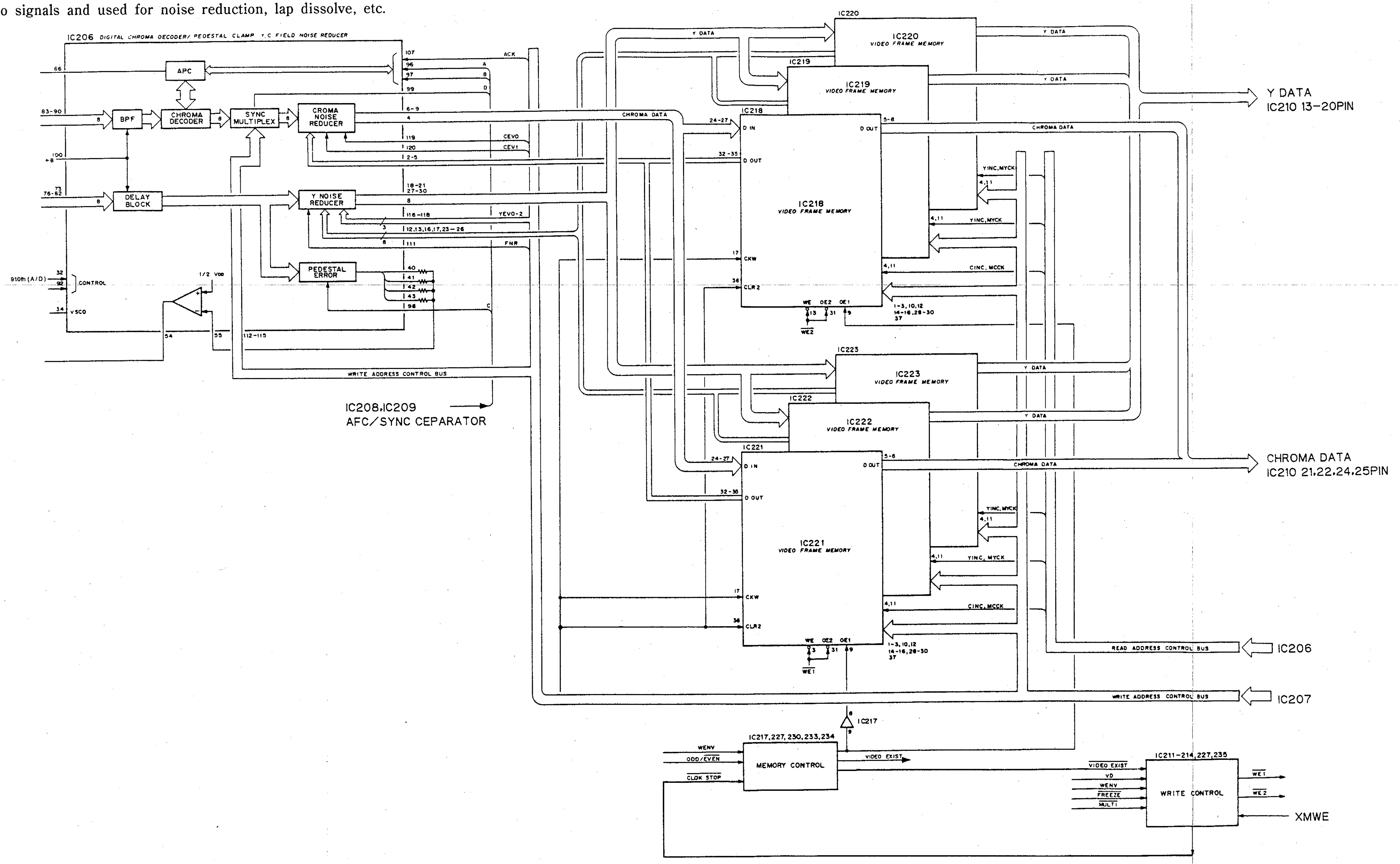

IC206 DIGITAL CHROMA DECODER/ PEDESTAL CLAMP Y.C FIELD NOISE REDUCER
APC
BPF
CHROMA DECODER
SYNC MULTIPLEX
CROMA NOISE REDUCER
DELAY BLOCK
Y NOISE REDUCER
PEDESTAL ERROR
910fh (A/D)
CONTROL
VSCO
1/2 VDD
ACK
CEVO
CEV1
YEVO-2
FNR
WRITE ADDRESS CONTROL BUS
IC208,IC209
AFC/SYNC CEPARATOR
Y DATA
CHROMA DATA
IC220 VIDEO FRAME MEMORY
IC219 VIDEO FRAME MEMORY
IC218 VIDEO FRAME MEMORY
IC223 VIDEO FRAME MEMORY
IC222 VIDEO FRAME MEMORY
IC221 VIDEO FRAME MEMORY
D IN
D OUT
CKW
CLR2
WE OE2 OE1
WE2
WE1
YINC, MYCK
CINC, MCCK
Y DATA
IC210 13–20PIN
CHROMA DATA
IC210 21,22,24,25PIN
READ ADDRESS CONTROL BUS
IC206
WRITE ADDRESS CONTROL BUS
IC207
IC217
IC217,227,230,233,234
MEMORY CONTROL
WENV
ODD/EVEN
CLOK STOP
VIDEO EXIST
IC211–214,227,235
WRITE CONTROL
VIDEO EXIST
VD
WENV
FREEZE
MULTI
WE1
WE2
XMWE

Fig. 4-4. Memory Circuit Block Diagram

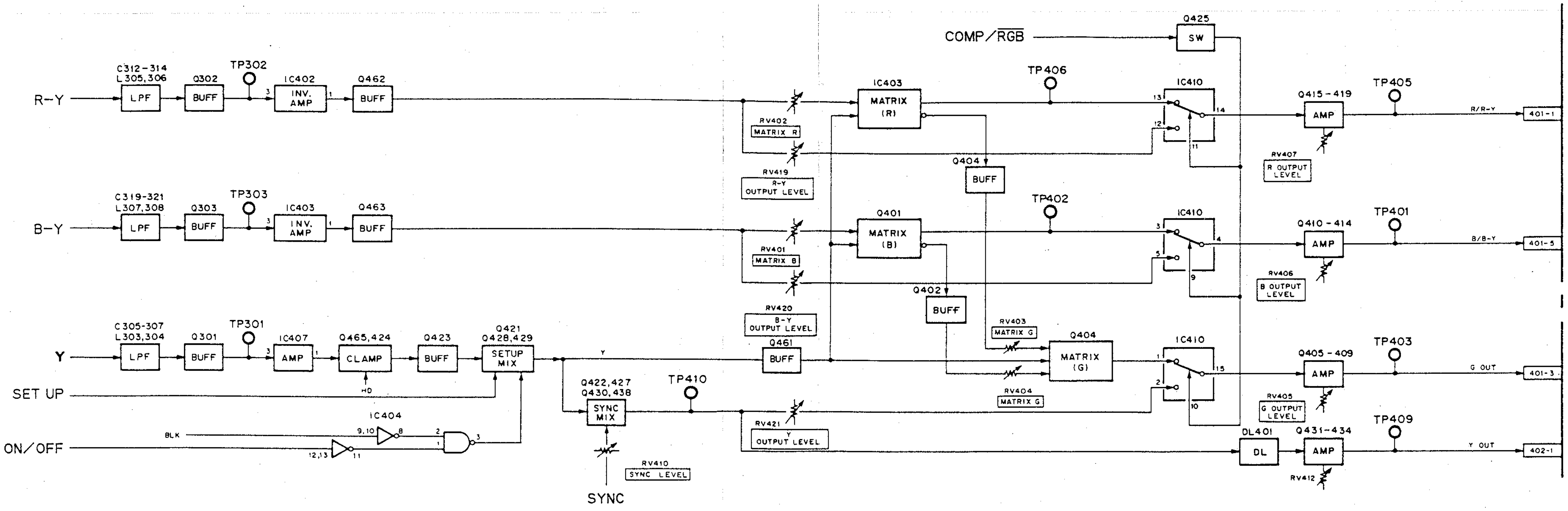

R-Y
B-Y
Y
SET UP
ON/OFF
C312-314
L305,306
C319-321
L307,308
C305-307
L303,304
LPF
Q302
Q303
Q301
BUFF
TP302
TP303
TP301
IC402
IC403
IC407
INV. AMP
AMP
Q462
Q463
BUFF
Q465,424
CLAMP
HD
Q423
BUFF
Q421
Q428,429
SETUP MIX
BLK
IC404
Q422,427
Q430,438
SYNC MIX
TP410
RV410
SYNC LEVEL
SYNC
RV402
MATRIX R
RV419
R-Y OUTPUT LEVEL
RV401
MATRIX B
RV420
B-Y OUTPUT LEVEL
Q461
BUFF
RV421
Y OUTPUT LEVEL
COMP/RGB
Q425
SW
IC403
MATRIX (R)
Q401
MATRIX (B)
Q404
BUFF
Q402
BUFF
RV403
MATRIX G
RV404
MATRIX G
Q404
MATRIX (G)
TP406
TP402
IC410
Q415-419
Q410-414
Q405-409
Q431-434
AMP
DL401
DL
RV407
R OUTPUT LEVEL
RV406
B OUTPUT LEVEL
RV405
G OUTPUT LEVEL
RV412
TP405
TP401
TP403
TP409
R/R-Y
B/B-Y
G OUT
Y OUT
401-1
401-5
401-3
402-1

Fig. 4-5. COMPONENT/RGB Output Circuit Block Diagram

4-8. RGB MATRIX AND Y/R−Y/B−Y OUTPUT CIRCUIT

The RGB matrix and Y/R−Y/B−Y output circuit receives the Y/R−Y/B−Y signals converted from digital to analog by IC301 to IC303 as its input and puts each signal at its reference level. Below are explanations of how each signal is processed.

4-8-1. Y output circuit

The Y signals converted from digital to analog at IC301 go through a low pass filter, then are amplified about 20 dB at IC407. After being hard clamped by the block comprising Q465, Q424 and Q423, these signals are input to the setup level setting circuit comprising Q428, Q429 and Q421. One of the outputs goes through Q461, then flows to the RGB matrix circuit. The other output goes through Q422, has the SYNC produced by Q427 and Q438 added, then goes through Q430 and is input to Pin 2 of IC410. When component output is selected by the DIP switch (the base of Q425 is "High"), the signal is output from Pin 15 of IC410, goes through the grounded-base amp comprising Q405 to Q409 and is output at Pin 3 of CN401. Since Y and G share the output amp circuit, the Y gain is adjusted with RV421.

4-8-2. R−Y output circuit

The R−Y signals converted from digital to analog at IC302 go through a low pass filter, are amplified about 20 dB at IC402, go through Q462, and are input to Pin 12 of IC410. When component output is selected by the DIP switch (the base of Q425 is "High"), the signal is output from Pin 14 of IC410, goes through the grounded-base amp comprising Q415 to Q419 and is output at Pin 1 of CN401. Since R−Y and R share the output amp circuit, the R−Y gain is adjusted with RV419.

4-8-3. B−Y output circuit

The B−Y signals converted from digital to analog at IC303 go through a low pass filter, are amplified about 20 dB at IC403, go through Q463, and are input to Pin 5 of IC410. When component output is selected by the DIP switch (the base of Q425 is "High"), the signal is output from Pin 4 of IC410, goes through the grounded-base amp comprising Q410 to Q414 and is output at Pin 5 of CN401. Since B−Y and B share the output amp circuit, the B−Y gain is adjusted with RV420.

4-8-4. R output circuit

The R signal is made from the R−Y signal and the Y signal. After each of those signals has been converted from digital to analog and has passed through its 20dB amp (IC402 and IC407), they are added by R409, R410 and RV402 to make the R signal. Then the R signal goes through Q403 and is input to Pin 13 of IC410. When RGB output is selected by the DIP switch (the base of Q425 is "LOW"), the signal is output from Pin 14 of IC410, goes through the R−Y output amp comprising Q415 to Q419 already mentioned, and is output at Pin 1 of CN401. The mixing ratio between R−Y and Y is adjusted with RV402 and the R signal gain is adjusted with RV407.

4-8-5. B output circuit

The B signal is made from the B−Y signal and the Y signal. After each of those signals has been converted from digital to analog and has passed through its 20 dB amp (IC403 and IC407), they are added by R404, R405 and RV401 to make the B signal. Then the B signal goes through Q401 and is input to Pin 3 of IC410. When RGB output is selected by the DIP switch (the base of Q425 is "LOW"), the signal is output from Pin 4 of IC410, goes through the B−Y output amp comprising Q410 to Q414 already mentioned and is output at Pin 5 of CN401. The mixing ratio between B−Y and Y is adjusted with RV401 and the B signal gain is adjusted with RV406.

4-8-6. G output circuit

The G signal is made from the R signal, B signal, and Y signal, already discussed. These signals are output from Q404 (R signal), Q402 (B signal), and Q461 (Y signal) and added by R414 to R416, RV403 and RV404 to make the G signal, which is then input to Pin 1 of IC410. When RGB output is selected by the DIP switch (the base of Q425 is "LOW"), the signal is output from Pin 15 of IC410, goes through the Y amp comprising Q405 to Q409 already mentioned and is output at Pin 3 of CN401. The R, B, and Y mixing ratio is adjusted with RV403 and RV404 and the G signal gain is adjusted with RV405.

4-9. ENCODER AND VIDEO OUTPUT CIRCUITS

4-9-1. Encoder circuit

This circuit modulates by fsc the chroma signals (R−Y and B−Y) which are converted from digital to analog and taken from the memory circuits, and generates chroma components of composite video and S-Video signals.
The R−Y signal that was converted from digital to analog then passed through a 20dB amp goes through the variable resistor RV441 (chroma balance adjustment), then is hard clamped with the sync pulse at Q487 and Q482 and is input to IC411 Pin 1. On the other hand, the B−Y signal that was converted from digital to analog then passed through a 20dB amp is hard clamped with the sync pulse at Q488 and Q483 and is input to IC411 Pin 4. The chroma signal input to IC411 Pin 4 is modulated within the IC using the subcarriers out of phase from each other by 90° that are input to Pins 3 and 5 and using the Line Alternate signal input to Pin 14. The result is output from Pin 8.
On the other hand, the BF pulses input to IC411 Pin 12 are modulated within the IC using the subcarriers out of phase from each other by 90° that are input to Pins 11 and 13 and using the Line Alternate signal input to Pin 14. The result is output from Pin 9.
The chroma signal output from IC411 Pin 8 and the burst signal output from Pin 9 have their levels adjusted with RV444 and RV443, then are mixed by Q484 and Q485, respectively, and the result input to the BF401 band pass filter.
When the ACK read out from memory is H (meaning that the input video is black-and-white), the chroma signals are cut by Q486 for black-and-white video signal output.
The chroma signal that has gone through BF401 goes through the Q455 buffer and is sent to the S-Video (C) output circuit and the composite video output circuit.

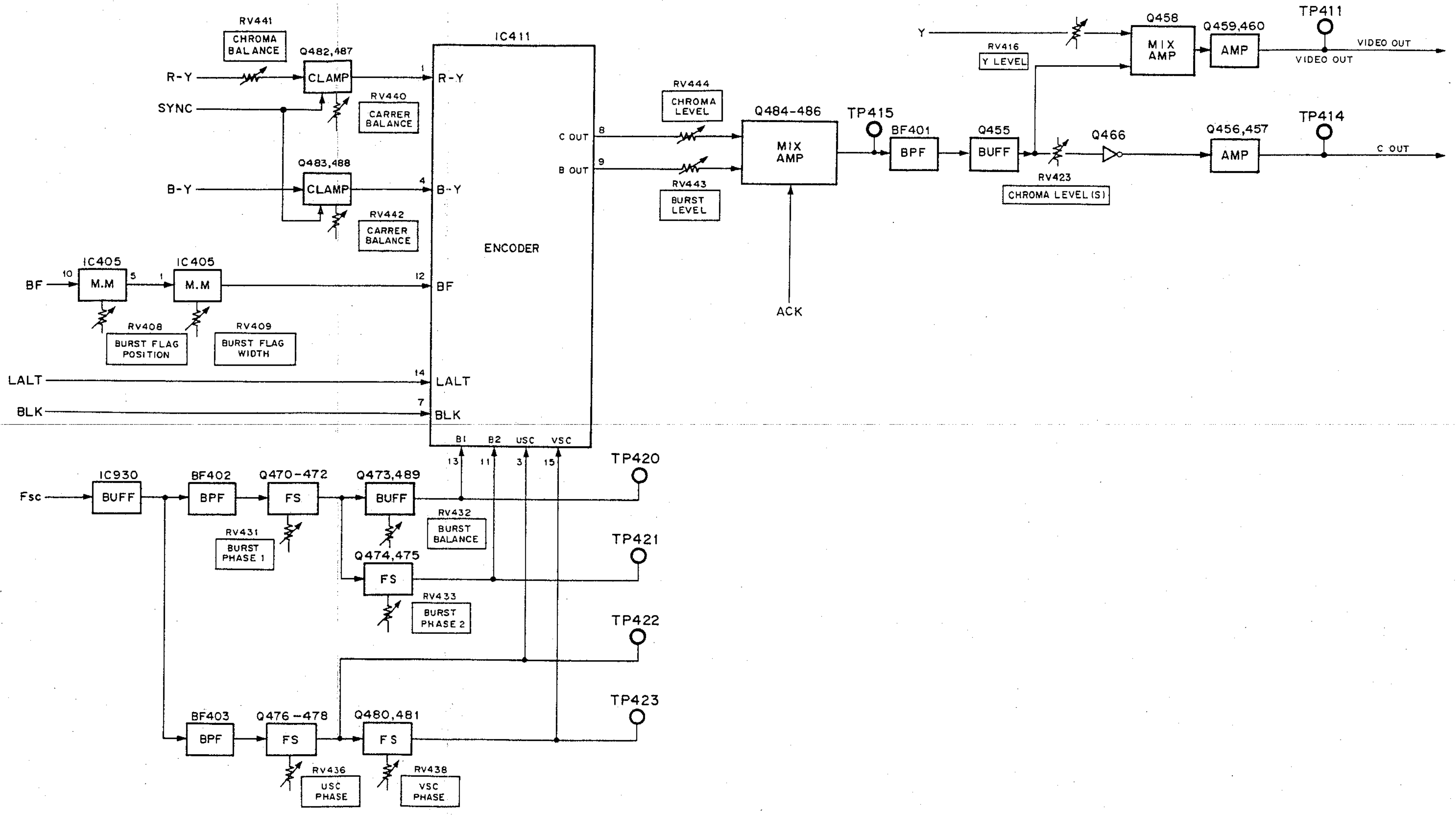

RV441
CHROMA BALANCE
Q482,487
R-Y
CLAMP
SYNC
RV440
CARRER BALANCE
Q483,488
B-Y
CLAMP
RV442
CARRER BALANCE
IC411
1
R-Y
4
B-Y
ENCODER
C OUT
8
B OUT
9
IC405
10
M.M
5
IC405
1
M.M
BF
12
BF
RV408
BURST FLAG POSITION
RV409
BURST FLAG WIDTH
LALT
14
LALT
BLK
7
BLK
B1
B2
USC
VSC
13
11
3
15
Fsc
IC930
BUFF
BF402
BPF
Q470-472
FS
RV431
BURST PHASE 1
Q473,489
BUFF
RV432
BURST BALANCE
Q474,475
FS
RV433
BURST PHASE 2
BF403
BPF
Q476-478
FS
RV436
USC PHASE
Q480,481
FS
RV438
VSC PHASE
TP420
TP421
TP422
TP423
RV444
CHROMA LEVEL
RV443
BURST LEVEL
Q484-486
MIX AMP
ACK
TP415
BF401
BPF
Q455
BUFF
RV423
CHROMA LEVEL (S)
Q466
Y
RV416
Y LEVEL
Q458
MIX AMP
Q459,460
AMP
TP411
VIDEO OUT
VIDEO OUT
Q456,457
AMP
TP414
C OUT

Fig. 4-6. ENCODER Circuit Block Diagram

4-9-2. 90° phase circuit

The chroma and burst fsc are made from the fsc made in IC907. These fsc are 90° out of phase with each other. Each fsc is input to IC411. Q470 to Q473 and Q489 make the fsc for Burst 1, Q474 and Q475 make the fsc for Burst 2, Q476 to Q479 make the B−Y fsc, and Q480 and Q481 make the R−Y fsc.

4-9-3. S-Video (Y) output circuit

After the Y signal to which the setup and sync have been added goes through the DL401 delay line and the Q431 buffer, it goes through the grounded-base amp comprising Q432 to Q434 and is output at Pin 1 of CN402. The S-Video (Y) signal gain is adjusted with RV412.

4-9-4. S-Video (C) output circuit

The chroma signal that has gone through BF401 and Q455 goes through the grounded-base amp comprising Q466, Q456 and Q457, then is output at Pin 3 of CN402. The S-Video (C) signal gain is adjusted with RV423.

4-9-5. Composite video output circuit

The Y signal that has passed through DL401 and Q431 and the C signal that has passed through BF401 and Q455 are mixed and the resulting signal goes through the grounded-base amp comprising Q458 to Q460 and is output at Pin 5 of CN402. The gain for the Y component of the composite video signal is adjusted with RV416 and the C component is adjusted with RV444 and the burst level is adjusted with RV443.

4-9-6. Sync output circuit

The Sync signal made by IC907 goes through the amp comprising Q435 to Q437 and is output to Pin 7 of CN401 as the RGB Sync.

4-10. SETUP ADDITION CIRCUIT

This circuit adds the setup to the input video signal. The setup can be added by clamping the video signal, fixing the DC level, then adding the blanking signal.

The input video signal is hard clamped by Q465 and Q424. The blanking pulses for setup are switched on/off by the IC404 gate. When this gate is on, the setup pulse is added by Q428.

The setup level is set by the bias of Q429. This bias is set by the front panel SET UP volume (RV304) connected to Pin 2 of CN403.

4-11. SYNC ADDITION CIRCUIT

The Y signal converted from digital to analog is output with the sync removed, so sync is added. As described earlier, the Y signal that has been converted from digital to analog goes through a low pass filter, a 20 dB amp, a clamp circuit, and the setup addition circuit, then is divided into the RGB (no sync) and component/composite Y signals. The component/composite Y signal has sync added at the base of Q430.

On the other hand, the sync that is added is made by IC907 in the Gen Lock circuit, has its level adjusted with RV510, has its bandwidth restricted by Q427 and Q438, then is mixed with the Y signal at the base of Q430.

The Y signal to which the sync has been added goes through the Q430 buffer. Then the signal is sent through RV421 to the Y output amp as the component Y signal on the one hand. On the other hand, the signal goes through the DL401 delay line and Q431, has its delay relative to the chroma signal adjusted, then is sent to the S-Video (Y) output amp and the composite video output amp.

4-12. GEN LOCK CIRCUIT

This circuit outputs video signal locked to REF VIDEO input from outside. Separates SYNC and subcarrier from REF VIDEO, and outputs SYNC and subcarrier which are phase synchronous to these.

On the other hand, when REF VIDEO signal is not input from the outside, the sync and the subcarrier stabilized by X901 and X902 are output.

- Y/C Separation

  The REF VIDEO input from pin 1 of CN901, is amplified at Q901, Q902 and Q903.

  On the one hand, subcarrier components are separated by a bandpass filter C907 and L904, and converted to TTL level by IC901.

  On the other hand, high band components are removed by low pass filter. Then, signal is amplified and converted to TTL level by IC902, IC903.

- Phase Comparsion (HD)

  Phase is compared between SYNC separated at IC904 and HD output from IC907 for synchronous signal generation. Phase error voltage gained here is buffered at Q905 and added to X902 VCO. This VCO clock is added to IC907 and become reference for SYNC generation and forms PLL loop.

- Phase Comparsion (SC)

  Phase is compared between subcarrier separated at IC904 and SC output from IC907. Phase error voltage gained here passes IC906 LPF and is added to VCO (X901). This VCO clock is added to IC907 and becomes reference for SC generation and forms a PLL loop.

- H PHASE Adjustment Circuit

  This circuit is located inside the phase compartion (HD) loop and consists of mono-multi IC (MM) IC912 (1/2). MM pulse width is changed by turning front panel H PHASE to vary H phase between REF VIDEO.

- SC PHASE Adjustment Circuit

  This circuit is located inside the phase compartion (SC) loop and consists of IC911 (MM) and IC910 (operation amplifier IC). Pulse width of IC911 (2/2) is changed by turning front panel SC PHASE volume to adjust the phase differenc between SC in REF VIDEO. At this state, the duty ratio is changed so the duty will be returned to 50% in the following IC911 (1/2).

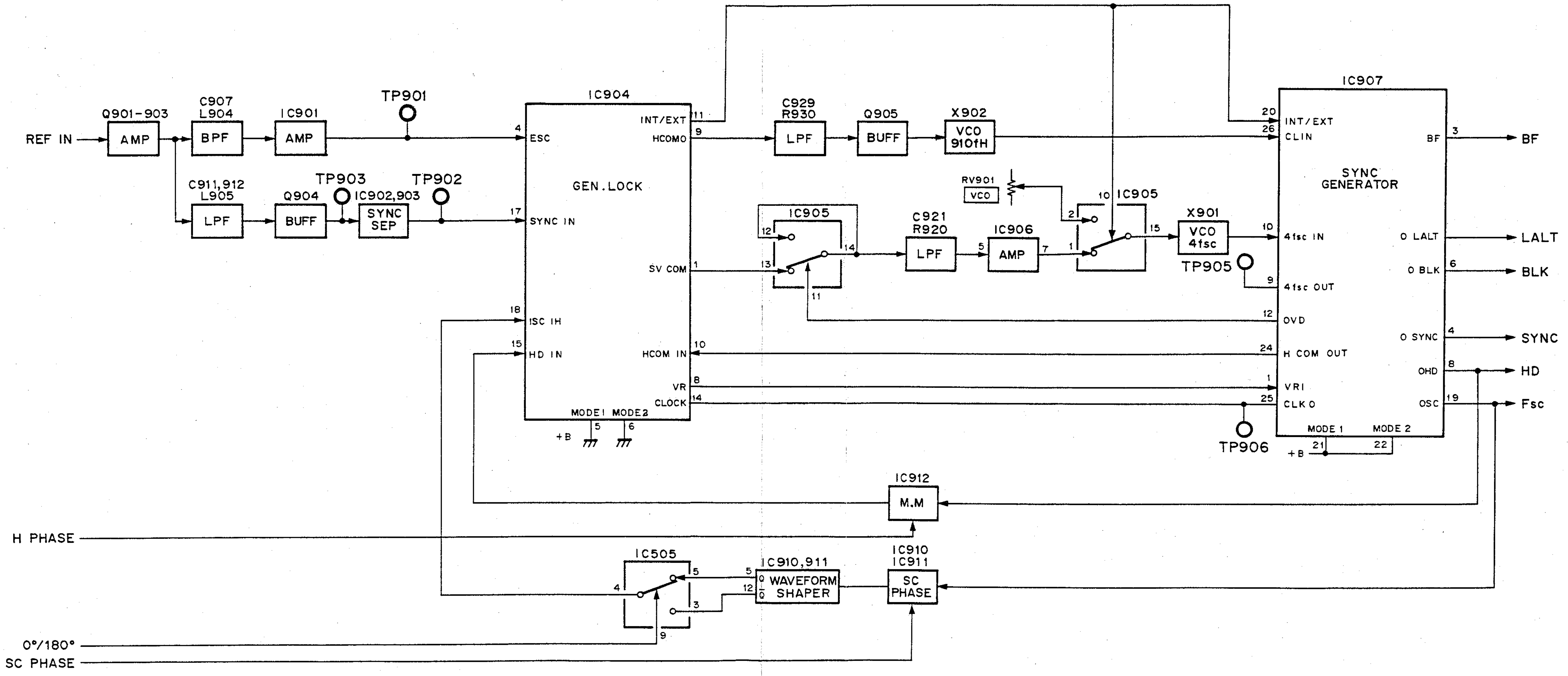

REF IN
Q901-903
AMP
C907
L904
BPF
IC901
AMP
TP901
C911,912
L905
LPF
Q904
BUFF
TP903
IC902,903
SYNC SEP
TP902
IC904
GEN.LOCK
ESC
SYNC IN
ISC IH
HD IN
INT/EXT
HCOMO
SV COM
HCOM IN
VR
CLOCK
MODE1
MODE2
+B
C929
R930
LPF
Q905
BUFF
X902
VCO 910fH
RV901
VCO
IC905
C921
R920
LPF
IC906
AMP
X901
VCO 4fsc
TP905
TP906
IC907
SYNC GENERATOR
INT/EXT
CLIN
4fsc IN
4fsc OUT
OVD
H COM OUT
VRI
CLK O
MODE 1
MODE 2
BF
O LALT
O BLK
O SYNC
OHD
OSC
BF
LALT
BLK
SYNC
HD
Fsc
IC912
M.M
H PHASE
IC505
IC910,911
WAVEFORM SHAPER
IC910
IC911
SC PHASE
0°/180°
SC PHASE

Fig. 4-7. GEN LOCK Circuit Block Diagram